Transcend Wireless

10 Industrial Ave,
Suite 3
Mahwah NJ 07430

Phone: 201.684.0055
Fax: 201.684.0066

June 5, 2018

Melanie Bachman
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Notice of Exempt Modification
38 Spring Hill Lane, Bethel, CT 06801
Latitude- 41.36222
Longitude- -73.39667

Dear Ms. Bachman,

T-Mobile currently maintains (9) existing antennas 102' level of the existing 125' monopole at 38 Sprint Hill Road in Bethel, CT. The tower and property is owned by Blue Sky Tower Partners, LLC. T-Mobile now intends to replace (6) of its existing antennas with (6) new 600/700/1900/2100 MHz antennas. These antennas would be installed at the same 102' level of the tower. T-Mobile also intends to install (3) remote radio heads and (2) fiber cables.

This facility was approved by the Council on May 11, 2005, in Docket No. 288.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. 16-50j-72(b)(2). In accordance with R.C.S.A. 16-50j-73, a copy of this letter is being sent to Matt Knickerbocker, First Selectmen of the Town of Bethel, Beth Cavagna, Planning Director of the Town of Bethel, as well as the property owner and tower owner.

The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. 16-50j-72(b)(2).

1. The proposed modification will not result in an increase in the height of the existing structure

2. The proposed modifications will not require the extension of the site boundary.

3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.

4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard.

5. The proposed modification will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The existing structure and its foundation can support the proposed loading.

For the foregoing reasons, T-Mobile respectfully submits that the proposed modifications to the above-referenced telecommunications facility constitute an exempt modification under R.C.S.A. 16-50j-72(b)(2).

Sincerely,

Kyle Richers

Kyle Richers
Transcend Wireless
10 Industrial Ave., Suite 3
Mahwah, New Jersey 07430
908-447-4716
krichers@transcendwireless.com

cc: Matt Knickerbocker- as elected official
Beth Cavagna- as zoning official
Blue Sky Tower Partners, LLC- as tower and property owner

Bethel, CT : Assessor Database

Property Search:

Parcel ID:	Alternate ID:	Owner 1 Name:	Street Number:	Street Name:
			38	SPRING HILL LANE

Search Reset

Property Detail:

Parcel ID:	Alternate ID/Map Block Lot:	Card:	Card:	Street Name:	Street Number:	Zoning:	LUC:	Acres:
32 47A 121	R06064			SPRING HILL LANE	38	R-40	PP FOR PUBLIC UTILITIES	1.63

Owner Information:

Owner 1 Name:	BLUE SKY TOWERS LLC
Owner 2 Name:	
Street 1:	158 MAIN STREET STE #2
Street 2:	
City:	NORFOLK
State:	MA
Zip:	02056
Volume:	1051
Page:	496
Deed Date:	0000-00-00

Property Images:

Picture:

There is no picture available.

Sketch:

There is no sketch available.

Valuation:

Appraised Land:	$151,300.00
Appraised Land PA490:	$0.00
Appraised Bldg:	$942,200.00
Appraised Total:	$1,093,500.00
Total Assessment:	$765,450.00

Sales History:

Book:	Page:	Sale Date:	Price:	Validity:	Sale Type:
1051	496	10/03/2014	220,720	23	2
979	229	10/02/2009	240,000	03	1
455	393	12/20/1988			

Out-Buildings:

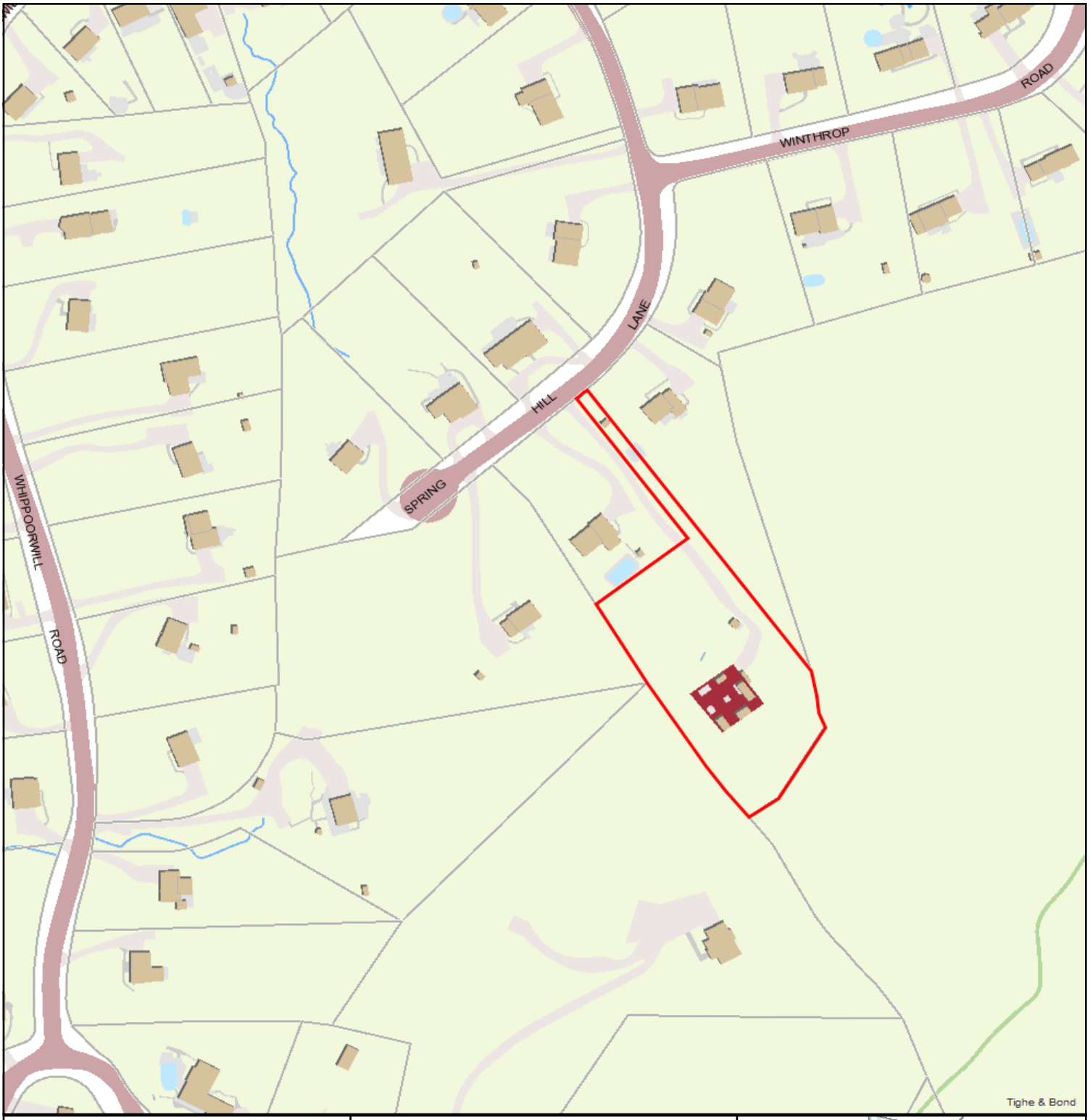
Code:	Description:	Units:	Year Built:	Size1:	Size2:	Area:	Grade:	Condition:
RS1	FRAME UTILITY SHED	1	2006	9	23	207	B	GOOD (Comm)
RS1	FRAME UTILITY SHED	1	2006	8	15	120	B	GOOD (Comm)
RS1	FRAME UTILITY SHED	1	2006	9	12	108	B	GOOD (Comm)
RS1	FRAME UTILITY SHED	1	2006	10	12	120	B	GOOD (Comm)
TT4	TOWER CELLULAR	1	2011	1	120	120	A	GOOD (Comm)

The information delivered through this on-line database is provided in the spirit of open access to government information and is intended as an enhanced

service and convenience for citizens of Bethel, CT.
The providers of this database: Tyler CLT, Big Room Studios, and Bethel, CT assume no liability for any error or omission in the information provided here.

Comments regarding this service should be directed to: Assessor@betheltownhall.org

Tue. May 22, 2018 : 10:21 AM : 0.08s : 10mb



SPRING HILL LANE

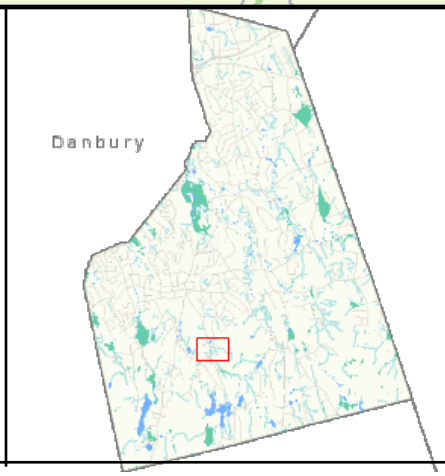
6/5/2018 11:11:40

1"=200'

Property Information

Parcel ID	32 47A 121
Address	SPRING HILL LANE
Total Value	800000

The information depicted on this map is for planning purposes only. It is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analyses.



EBI Consulting
environmental | engineering | due diligence

RADIO FREQUENCY EMISSIONS ANALYSIS REPORT
EVALUATION OF HUMAN EXPOSURE POTENTIAL TO NON-IONIZING EMISSIONS

T-Mobile Existing Facility

Site ID: CT11115F

CT115/SNET Valley_FT
38 Spring Hill Lane
Bethel, CT 06801

June 4, 2018

EBI Project Number: 6218004243

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general population allowable limit:	25.22 %

21 B Street · Burlington, MA 01803 · Tel: (781) 273.2500 · Fax: (781) 273.3311

EBI Consulting
environmental | engineering | due diligence

June 4, 2018

T-Mobile USA
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, CT 06002

Emissions Analysis for Site: **CT11115F – CT115/SNET Valley_FT**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **38 Spring Hill Lane, Bethel, CT**, for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (μW/cm2). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General population/uncontrolled exposure limits apply to situations in which the general population may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general population would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limit for the 600 MHz and 700 MHz Bands are approximately 400 $\mu W/cm^2$ and 467 $\mu W/cm^2$ respectively. The general population exposure limit for the 1900 MHz (PCS) and 2100 MHz (AWS) bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at **38 Spring Hill Lane, Bethel, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

For all calculations, all equipment was calculated using the following assumptions:

1) 2 GSM channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

2) 2 UMTS channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

3) 2 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

4) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

5) 2 LTE channels (600 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

6) 2 LTE channels (700 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

7) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.

8) For the following calculations the sample point was the top of a 6-foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications minus 10 dB was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

9) The antennas used in this modeling are the **Ericsson AIR32 B66A/B2A** & **Ericsson AIR21 B2A/B4P** for 1900 MHz (PCS) and 2100 MHz (AWS) channels and the **RFS APXVAA24-43-U-A20** for 600 MHz and 700 MHz channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **Ericsson AIR32 B66A/B2A** has a maximum gain of **15.9 dBd** at its main lobe at 1900 MHz and 2100 MHz. The **Ericsson AIR21 B2A/B4P** has a maximum gain of **15.9 dBd** at its main lobe at 1900 MHz and 2100 MHz. The **RFS APXVAA24-43-U-A20** has a maximum gain of **13.15 dBd** at its main lobe at 600 MHz and a maximum gain of **13.55 dBd** at its main lobe at 700 MHz. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

10) The antenna mounting height centerline of the proposed antennas is **102 feet** above ground level (AGL).

11) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

12) All calculations were done with respect to uncontrolled / general population threshold limits.

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	Ericsson AIR32 B66A/B2A	Make / Model:	Ericsson AIR32 B66A/B2A	Make / Model:	Ericsson AIR32 B66A/B2A
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	102	Height (AGL):	102	Height (AGL):	102
Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	240	Total TX Power(W):	240	Total TX Power(W):	240
ERP (W):	9,337.08	ERP (W):	9,337.08	ERP (W):	9,337.08
Antenna A1 MPE%	**3.64**	Antenna B1 MPE%	**3.64**	Antenna C1 MPE%	**3.64**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	102	Height (AGL):	102	Height (AGL):	102
Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	120	Total TX Power(W):	120	Total TX Power(W):	120
ERP (W):	4,668.54	ERP (W):	4,668.54	ERP (W):	4,668.54
Antenna A2 MPE%	**1.82**	Antenna B2 MPE%	**1.82**	Antenna C2 MPE%	**1.82**
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	RFS APXVAA24-43-U-A20	Make / Model:	RFS APXVAA24-43-U-A20	Make / Model:	RFS APXVAA24-43-U-A20
Gain:	13.15/ 13.55 dBd	Gain:	13.15/ 13.55 dBd	Gain:	13.15/ 13.55 dBd
Height (AGL):	102	Height (AGL):	102	Height (AGL):	102
Frequency Bands	600 MHz / 700 MHz	Frequency Bands	600 MHz / 700 MHz	Frequency Bands	600 MHz / 700 MHz
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	120	Total TX Power(W):	120	Total TX Power(W):	120
ERP (W):	2,598.01	ERP (W):	2,598.01	ERP (W):	2,598.01
Antenna A3 MPE%	**2.35**	Antenna B3 MPE%	**2.35**	Antenna C3 MPE%	**2.35**

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile (Per Sector Max)	**7.81 %**
Bethel PD	0.00 %
Thomas Refuse	0.00 %
Utilty Cmcns	0.00 %
Valley Cmcns	0.00 %
Yankee Gas	0.00 %
Sprint	4.50 %
AT&T	4.73 %
Nextel	2.44 %
Verizon Wireless	5.74 %
Site Total MPE %:	**25.22 %**

T-Mobile Sector A Total:	7.81 %
T-Mobile Sector B Total:	7.81 %
T-Mobile Sector C Total:	7.81 %
Site Total:	25.22 %

T-Mobile Per Sector Max Power Values

T-Mobile _per sector	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
T-Mobile AWS - 2100 MHz LTE	2	2,334.27	102	18.21	AWS - 2100 MHz	1000	1.82%
T-Mobile PCS - 1900 MHz LTE	2	2,334.27	102	18.21	PCS - 1900 MHz	1000	1.82%
T-Mobile AWS - 2100 MHz UMTS	2	1,167.14	102	9.11	AWS - 2100 MHz	1000	0.91%
T-Mobile PCS - 1900 MHz GSM	2	1,167.14	102	9.11	PCS - 1900 MHz	1000	0.91%
T-Mobile 600 MHz LTE	2	619.61	102	4.83	600 MHz	400	1.21%
T-Mobile 700 MHz LTE	2	679.39	102	5.30	700 MHz	467	1.14%
						Total:	**7.81%**

Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general population exposure to RF Emissions.

The anticipated maximum composite contributions from the T-Mobile facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general population exposure to RF emissions are shown here:

T-Mobile Sector	Power Density Value (%)
Sector A:	7.81 %
Sector B:	7.81 %
Sector C:	7.81 %
T-Mobile Per Sector Maximum:	7.81 %
Site Total:	25.22 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **25.22%** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

FCC guidelines state that if a site is found to be out of compliance (over allowable thresholds), that carriers over a 5% contribution to the composite value will require measures to bring the site into compliance. For this facility, the composite values calculated were well within the allowable 100% threshold standard per the federal government.

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

125-ft Existing EEI Monopole

Proposed T-Mobile
Antenna Upgrade

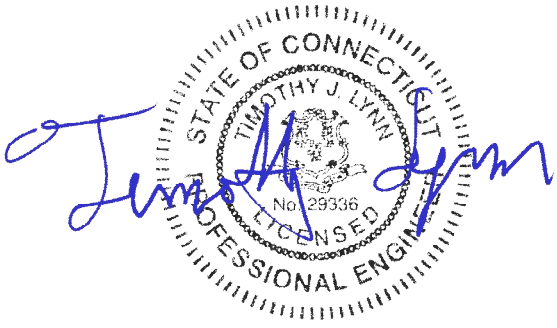
Site Ref: CT11115F

38 Spring Hill Lane
Bethel, CT

CENTEK Project No. 18058.27

~~Date: May 9, 2018~~

Rev 2: May 18, 2018



Prepared for:

T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002

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Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna upgrade proposed by T-Mobile on the existing monopole (tower) located in Bethel, CT.

The host tower is a 125-ft tall, three-section, eighteen sided, tapered monopole originally designed and manufactured by EEI job no; 14009-E01, dated March 9, 2006. The tower geometry, structure member sizes and foundation system information were obtained from the aforementioned tower design documents. Antenna and appurtenance information were obtained from a previous structural report prepared by Ramaker & Associates job no. 37840 dated April 19, 2018 and a RF data sheet.

The tower is made up of three (3) tapered vertical sections consisting of A572-65 pole sections. The vertical tower sections are slip joint connected. The diameter of the pole (flat-flat) is 18.00-in at the top and 55.00-in at the base.

Antenna and Appurtenance Summary

The existing, proposed and future loads considered in this analysis consist of the following:

- TOWN (EXISTING):
  Antennas: One (1) 18' x 4" Omni-directional whip antenna mounted on a 4-ft standoff with an elevation of 124-ft above existing grade.
  Coax Cables: Two (2) 1-5/8" ∅ coax cables running on the inside of the existing monopole.
- AT&T (EXISTING):
  Antennas: Three (3) Powerwave 7770 panel antennas, one (1) CCI HPA-65R-BUU-H8 panel antenna, two (2) CCI HPA-65R-BUU-H6 panel antennas, one (1) CCI TPA-65R-LCUUUU-H8 panel antenna, two (2) Quintel QS66512-2 panel antennas, two (2) Kathrein 80010965 panel antennas, one (1) Kathrein 80010966 panel antenna, six (6) Powerwave LGP21401 TMA's, three (3) Ericsson B14 4478 remote radio heads and six (6) Ericsson RRUS-32 mounted on a low profile platform with a RAD center elevation of 122-ft above existing grade.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on the inside of the existing monopole.
- AT&T (EXISTING):
  Antennas: Six (6) Ericsson RRUS-11 and three (3) Raycap DC6-48-60-18-8F surge arrestors mounted to one (1) universal ring mount with a RAD center elevation of 120-ft above existing grade level.
  Coax Cables: Three (3) fiber cable and six (6) dc control cables running on the inside of the existing monopole.

- SPRINT (EXISTING):
  Antennas: Three (3) RFS APXVSPP18-C-A20 panel antennas and three (3) RFS APXVTM14 panel antennas mounted to a low profile platform with a RAD center elevation of 114-ft above the existing tower base plate. Six (3) ALU 1900 MHz RRH's, three (3) ALU 800 MHz RRH's and three (3) ALU TD-RRH-820 remote radio heads mounted on a universal tr-bracket below the existing low profile platform.
  Coax Cables: Four (4) 1-5/8" ∅ Hybriflex cables running on the inside of the existing tower.
- VERIZON (EXISTING):
  Antennas: One (1) JMA X7C-FRO-660 panel antenna, six (6) Antel WWX063X19G00 panel antennas, one (1) Antel BXA-80063-6CF panel antenna, two (2) Antel BXA-80080-6CF panel antenna, two (2) Kathrein 800-10736 panel antennas, three (3) Alcatel-Lucent RRH2x60-700 remote radio heads, three (3) Alcatel-Lucent RRH2x60-PCS remote radio heads, three (3) Alcatel-Lucent RRH4x45/2x90-AWS remote radio heads and two (2) Raycap RC2DC-3315-PF-48 main distribution boxes mounted on a low profile platform with a RAD center elevation of 95-ft above grade level.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables and two (2) 1-5/8" ∅ fiber cables running inside the monopole.
- TOWN (EXISTING):
  Antennas: Two (2) 18' x 4" Omni-directional whip antennas mounted on the Verizon 13-ft low profile platform with an elevation of 92-ft above existing grade.
  Coax Cables: Two (2) 1-5/8" ∅ coax cables running on the inside of the existing monopole.
- EMPTY MOUNT (EXISTING):
  Mount: Low profile platform with an elevation of 82-ft above existing grade.
- TOWN (EXISTING):
  Antennas: One (1) 20' 4-bay dipole antenna mounted on a 13-ft low profile platform with an elevation of 72-ft above existing grade.
  Coax Cables: Two (2) 1-5/8" ∅ coax cables running on the inside of the existing monopole.
- T-MOBILE (EXISTING TO REMAIN):
  Antennas: Three (3) Ericsson AIR21 panel antennas and three (3) Ericsson KRY112 TMAs mounted on a low profile platform with a RAD center elevation of 102-ft above grade level
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables and one (1) 9x18 fiber line running inside the monopole.

- **T-MOBILE (EXISTING TO REMOVE):**
  Antennas: Three (3) Ericsson AIR21 panel antennas, three (3) Andrew LNX-6515DS panel antennas, three (3) Ericsson KRY112 TMAs and three (3) Ericsson RRUS-11 remote radio heads mounted on a low profile platform with a RAD center elevation of 102-ft above grade level.
- **T-MOBILE (PROPOSED):**
  Misc. Equipment: Three (3) Ericsson AIR32 panel antennas, three (3) RFS APXVAA24_43 panel antennas, three (3) Ericsson 4449 B71 B12 remote radio heads mounted on a low profile platform with a RAD center elevation of 102-ft above grade level.
  Coax Cables: Two (2) 6x12 fiber lines running on the interior of the monopole.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents or reinforcement drawings.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.
- All coax cables to be installed as indicated in this report.

Analysis

The existing tower was analyzed using a comprehensive computer program entitled tnxTower. The program analyzes the tower, considering the worst case loading condition. The tower is considered as loaded by concentric forces along the tower, and the model assumes that the tower members are subjected to bending, axial, and shear forces.

The existing tower was analyzed for the controlling basic wind speed (3-second gust) with no ice and the applicable wind and ice combination to determine stresses in members as per guidelines of TIA-222-G-2005 entitled "Structural Standard for Antenna Support Structures and Antennas", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Load and Resistance Factor Design (LRFD).

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix N of the CSBC[1] and the wind speed data available in the TIA-222-G-2005 Standard.

Tower Loading

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA-222-G-2005, gravity loads of the tower structure and its components, and the application of 0.75" radial ice on the tower structure and its components.

Basic Wind Speed:	Fairfield; v = 90-110 mph	*[Annex B of TIA-222-G-2005]*
	Bethel; v = 93 mph	*[Appendix N of the 2016 CT Building Code]*
Load Cases:	Load Case 1; 93 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Appendix N of the 2016 CT Building Code]*
	Load Case 2; 50 mph wind speed w/ 0.75" radial ice plus gravity load – used in calculation of tower stresses.	*[Annex B of TIA-222-G-2005]*

[1] The 2012 International Building Code as amended by the 2016 Connecticut State Building Code (CSBC).

Tower Capacity

- Calculated stresses were found to be within allowable limits. In Load Case 1, per tnxTower "Section Capacity Table", this tower was found to be at **97.5%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Pole Shaft (L2)	47.67'-96.04'	97.5%	**PASS**

Foundation and Anchors

The existing foundation consists of a 7-ft square x 1-ft long reinforced concrete pier on a 25.0-ft square x 4.5-ft thick reinforce concrete pad. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned EEI design documents. The base of the tower is connected to the foundation by means of (12) 2.25"∅, ASTM A615-75 anchor bolts embedded approximately 5-ft into the concrete foundation structure.

- The tower base reactions developed from the governing Load Case 1 were used in the verification of the foundation and its anchors:

Location	Vector	Proposed Reactions
Base	Shear	37 kips
	Compression	43 kips
	Moment	3315 kip-ft

- The foundation was found to be within allowable limits.

Foundation	Design Limit	TIA-222-G Section 9.4 (FS)[1]	Proposed Loading (FS)[1]	Result
Reinforced Concrete Pad and Pier	OTM[2]	1.0	1.61	**PASS**

Note 1: FS denotes Factor of Safety.

- The anchor bolts and base plate were found to be within allowable limits.

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Combined Axial and Shear	68.7%	**PASS**
Base Plate	Bending	90.1%	**PASS**

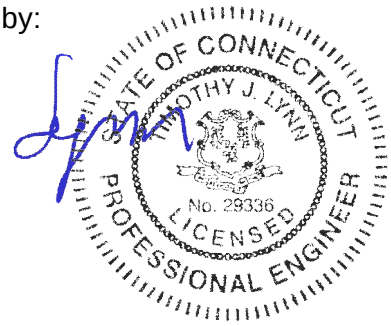
Conclusion

This analysis shows that the subject tower **is adequate** to support the proposed modified antenna configuration.

The analysis is based, in part, on the information provided to this office by T-Mobile. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:



Timothy J. Lynn, PE
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessarily limited to:

- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information provided to Centek Engineering, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the "as new" condition.
- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222
- All services performed, results obtained, and recommendations made are in accordance with generally accepted engineering principles and practices. Centek Engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

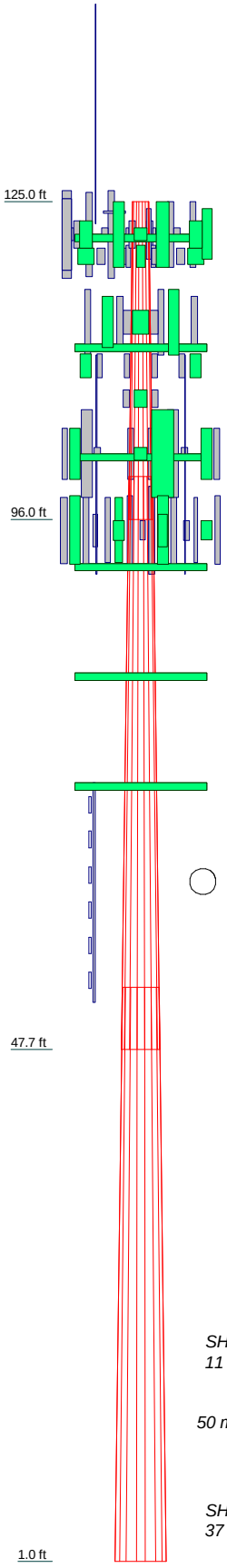
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, tnxTower, formerly ERITower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

tnxTower Features:

- tnxTower can analyze and design 3- and 4-sided guyed towers, 3- and 4-sided self-supporting towers and either round or tapered ground mounted poles with or without guys.
- The program analyzes towers using the TIA-222-G (2005) standard or any of the previous TIA/EIA standards back to RS-222 (1959). Steel design is checked using the AISC ASD 9th Edition or the AISC LRFD specifications.
- Linear and non-linear (P-delta) analyses can be used in determining displacements and forces in the structure. Wind pressures and forces are automatically calculated.
- Extensive graphics plots include material take-off, shear-moment, leg compression, displacement, twist, feed line, guy anchor and stress plots.
- tnxTower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	28.96	18	0.1875	3.92	18.0000	26.9000		1.3
2	52.29	18	0.2500	5.67	25.3212	41.2800	A572-65	4.7
3	52.33	18	0.3125		39.0504	55.0000		8.3
								14.2



ALL REACTIONS ARE FACTORED

AXIAL 77 K

SHEAR 11 K

MOMENT 990 ...

TORQUE 3 kip-ft

50 mph WIND - 0.7500 in ICE

AXIAL 43 K

SHEAR 37 K

MOMENT 3315 kip-ft

TORQUE 14 kip-ft

REACTIONS - 93 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
18' x 4" Dia Omni (Town - Existing)	124	AIR21 B2A/B4P (T-Mobile - Existing)	102
4-ft Standoff (Town - Existing)	124	APXVAARR24-43 (T-Mobile - Proposed)	102
7770.00 (ATI)	122	AIR32 (T-Mobile - Proposed)	102
HPA-65R-BUU-H8 (ATI)	122	AIR21 B2A/B4P (T-Mobile - Existing)	102
TPA-65R-LCUUUU-H8 (ATI)	122	APXVAARR24-43 (T-Mobile - Proposed)	102
80010966 (ATI)	122	AIR32 (T-Mobile - Proposed)	102
7770.00 (ATI)	122	KRY 112 TMA (T-Mobile - Existing)	102
HPA-65R-BUU-H6 (ATI)	122	KRY 112 TMA (T-Mobile - Existing)	102
QS66512-2 (ATI)	122	KRY 112 TMA (T-Mobile - Existing)	102
80010965 (ATI)	122	Radio 4449 B71 B12 (T-Mobile - Proposed)	102
7770.00 (ATI)	122	Radio 4449 B71 B12 (T-Mobile - Proposed)	102
HPA-65R-BUU-H6 (ATI)	122	Radio 4449 B71 B12 (T-Mobile - Proposed)	102
QS66512-2 (ATI)	122	EEI 14-ft Low Profile Platform (T-Mobile - Existing)	102
80010965 (ATI)	122	X7C-FRO-660-VRO (Verizon)	95
(2) LGP21401 TMA (ATI)	122	WWX063X19G00 (Verizon)	95
(2) LGP21401 TMA (ATI)	122	BXA-80063-6CF (Verizon)	95
(2) LGP21401 TMA (ATI)	122	WWX063X19G00 (Verizon)	95
(2) RRUS-32 (ATI)	122	800-10736 (Verizon)	95
(2) RRUS-32 (ATI)	122	WWX063X19G00 (Verizon)	95
(2) RRUS-32 (ATI)	122	BXA-80080-6CF (Verizon)	95
B14 4478 (ATI)	122	WWX063X19G00 (Verizon)	95
B14 4478 (ATI)	122	800-10736 (Verizon)	95
B14 4478 (ATI)	122	WWX063X19G00 (Verizon)	95
EEI 14-ft Low Profile Platform (ATI)	122	BXA-80080-6CF (Verizon)	95
(2) RRUS-11 (ATI)	120	WWX063X19G00 (Verizon)	95
(2) RRUS-11 (ATI)	120	RRH2x60-07-U (Verizon)	95
DC6-48-60-18-8F Surge Arrestor (ATI)	120	RRH2x60-07-U (Verizon)	95
DC6-48-60-18-8F Surge Arrestor (ATI)	120	RRH2x60-07-U (Verizon)	95
DC6-48-60-18-8F Surge Arrestor (ATI)	120	RRH2x60-AWS (Verizon)	95
Valmont Uni-Tri Bracket (ATI)	120	RRH2x60-AWS (Verizon)	95
(2) RRUS-11 (ATI)	120	RRH2x60-AWS (Verizon)	95
APXVSPP18-C-A20 (Sprint)	114	RRH2x60-PCS (Verizon)	95
APXVTM14 (Sprint)	114	RRH2x60-PCS (Verizon)	95
APXVSPP18-C-A20 (Sprint)	114	RRH2x60-PCS (Verizon)	95
APXVTM14 (Sprint)	114	DB-T1-6Z-8AB-0Z (Verizon)	95
APXVSPP18-C-A20 (Sprint)	114	DB-T1-6Z-8AB-0Z (Verizon)	95
APXVTM14 (Sprint)	114	EEI 14-ft Low Profile Platform (Verizon)	92
TD-RRH8x20-25 (Sprint)	114	18' x 4" Dia Omni (Town - Existing)	92
TD-RRH8x20-25 (Sprint)	114	18' x 4" Dia Omni (Town - Existing)	92
TD-RRH8x20-25 (Sprint)	114	EEI 14-ft Low Profile Platform (Town - Existing)	82
EEI 14-ft Low Profile Platform (Sprint)	112	EEI 14-ft Low Profile Platform (Town - Existing)	72
(2) FD-RRH 4x45 1900 (Sprint)	110	ANT150D6-9 (Town - Existing)	72
(2) FD-RRH 4x45 1900 (Sprint)	110		
(2) FD-RRH 4x45 1900 (Sprint)	110		
FD-RRH 2x50 800 (Sprint)	107		
FD-RRH 2x50 800 (Sprint)	107		
FD-RRH 2x50 800 (Sprint)	107		
AIR21 B2A/B4P (T-Mobile - Existing)	102		
APXVAARR24-43 (T-Mobile - Proposed)	102		
AIR32 (T-Mobile - Proposed)	102		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower designed for Exposure B to the TIA-222-G Standard.
2. Tower designed for a 93 mph basic wind in accordance with the TIA-222-G Standard.
3. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Structure Class II.
6. Topographic Category 3 with Crest Height of 250.00 ft
7. TOWER RATING: 97.5%

Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job:	***18058.27 - CT11115F***		
Project:	***125' EEI Monopole - 38 Sprill Hill Lane, Bethel, CT***		
Client: T-Mobile	Drawn by: TJL	App'd:	
Code: TIA-222-G	Date: 05/18/18	Scale: NTS	
Path:		Dwg No. E-1	

Tower Input Data

There is a pole section.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Basic wind speed of 93 mph.
Structure Class II.
Exposure Category B.
Topographic Category 3.
Crest Height 250.00 ft.
Nominal ice thickness of 0.7500 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Horizontals		Assume Legs Pinned		Calculate Redundant Bracing Forces
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Use Moment Magnification		Use Clear Spans For Wind Area		SR Leg Bolts Resist Compression
√	Use Code Stress Ratios		Use Clear Spans For KL/r		All Leg Panels Have Same Allowable
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		Offset Girt At Foundation
	Escalate Ice	√	Bypass Mast Stability Checks		Consider Feed Line Torque
	Always Use Max Kz		Use Azimuth Dish Coefficients		Include Angle Block Shear Check
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-G Bracing Resist. Exemption
	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Use TIA-222-G Tension Splice Exemption
	Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Poles
	Secondary Horizontal Braces Leg	√	Sort Capacity Reports By Component	√	Include Shear-Torsion Interaction
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Always Use Sub-Critical Flow
	SR Members Have Cut Ends		Treat Feed Line Bundles As Cylinder		Use Top Mounted Sockets
	SR Members Are Concentric				

Tapered Pole Section Geometry

Section	*Elevation* *ft*	*Section Length* *ft*	*Splice Length* *ft*	*Number of Sides*	*Top Diameter* *in*	*Bottom Diameter* *in*	*Wall Thickness* *in*	*Bend Radius* *in*	*Pole Grade*
L1	125.00-96.04	28.96	3.92	18	18.0000	26.9000	0.1875	0.7500	A572-65 (65 ksi)
L2	96.04-47.67	52.29	5.67	18	25.3212	41.2800	0.2500	1.0000	A572-65 (65 ksi)
L3	47.67-1.00	52.33		18	39.0504	55.0000	0.3125	1.2500	A572-65

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
									(65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	18.2777	10.6007	424.9328	6.3234	9.1440	46.4712	850.4248	5.3013	2.8380	15.136
	27.3150	15.8973	1433.1421	9.4829	13.6652	104.8753	2868.1699	7.9501	4.4044	23.49
L2	26.9257	19.8940	1579.8327	8.9003	12.8632	122.8182	3161.7442	9.9489	4.0165	16.066
	41.9168	32.5573	6924.5082	14.5657	20.9702	330.2064	13858.1278	16.2817	6.8253	27.301
L3	41.4066	38.4232	7284.5741	13.7520	19.8376	367.2100	14578.7333	19.2153	6.3229	20.233
	55.8485	54.2432	20495.5041	19.4141	27.9400	733.5542	41017.9768	27.1267	9.1300	29.216

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 125.00-96.04				1	1	1			
L2 96.04-47.67				1	1	1			
L3 47.67-1.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
1 5/8 (AT&T)	C	No	Inside Pole	123.00 - 4.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
						1" Ice	0.00	1.04
RG6-Fiber (AT&T)	C	No	Inside Pole	123.00 - 4.00	3	No Ice	0.00	1.00
						1/2" Ice	0.00	1.00
						1" Ice	0.00	1.00
#8 AWG Copper WIre (AT&T)	C	No	Inside Pole	123.00 - 4.00	6	No Ice	0.00	0.05
						1/2" Ice	0.00	0.05
						1" Ice	0.00	0.05
HYBRIFLEX 1-1/4" (Sprint - Existing)	C	No	Inside Pole	113.00 - 1.00	4	No Ice	0.00	1.30
						1/2" Ice	0.00	1.30
						1" Ice	0.00	1.30
1 5/8 (T-Mobile)	C	No	Inside Pole	103.00 - 4.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
						1" Ice	0.00	1.04
HYBRIFLEX 1-5/8" (T-Mobile)	C	No	Inside Pole	103.00 - 4.00	3	No Ice	0.00	1.90
						1/2" Ice	0.00	1.90
						1" Ice	0.00	1.90
1 5/8 (Verizon)	C	No	Inside Pole	93.00 - 1.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
						1" Ice	0.00	1.04
HYBRIFLEX 1-5/8" (Verizon)	C	No	Inside Pole	93.00 - 1.00	2	No Ice	0.00	1.90
						1/2" Ice	0.00	1.90
						1" Ice	0.00	1.90

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
1 5/8	C	No	Inside Pole	123.00 - 4.00	2	No Ice	0.00	1.04
(Town - Existing)						1/2" Ice	0.00	1.04
						1" Ice	0.00	1.04
1 5/8	C	No	Inside Pole	93.00 - 4.00	2	No Ice	0.00	1.04
(Town - Existing)						1/2" Ice	0.00	1.04
						1" Ice	0.00	1.04
1 5/8	C	No	Inside Pole	73.00 - 4.00	2	No Ice	0.00	1.04
(Town - Existing)						1/2" Ice	0.00	1.04
						1" Ice	0.00	1.04

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	125.00-96.04	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.70
L2	96.04-47.67	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	2.88
L3	47.67-1.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	2.76

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	125.00-96.04	A	1.920	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.70
L2	96.04-47.67	A	1.914	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	2.88
L3	47.67-1.00	A	1.827	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	2.76

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
18' x 4" Dia Omni	A	From Face	4.00	0.0000	124.00	No Ice	6.16	6.16	0.05
(Town - Existing)			0.00			1/2" Ice	9.04	9.04	0.10
			9.00			1" Ice	10.90	10.90	0.16
4-ft Standoff	A	From Face	2.00	0.0000	124.00	No Ice	1.20	0.07	0.03
(Town - Existing)			0.00			1/2" Ice	1.49	0.11	0.04
			0.00			1" Ice	1.78	0.16	0.06
7770.00	A	From Face	3.50	0.0000	122.00	No Ice	5.51	2.93	0.04
(AT&T)			-6.00			1/2" Ice	5.87	3.27	0.07
			0.00			1" Ice	6.23	3.63	0.11
HPA-65R-BUU-H8	A	From Face	3.50	0.0000	122.00	No Ice	12.98	7.52	0.07
(AT&T)			-2.00			1/2" Ice	13.56	8.09	0.14
			0.00			1" Ice	14.15	8.67	0.22
TPA-65R-LCUUUU-H8	A	From Face	3.50	0.0000	122.00	No Ice	13.30	8.82	0.08
(AT&T)			2.00			1/2" Ice	13.90	9.42	0.15
			0.00			1" Ice	14.50	10.03	0.24
80010966	A	From Face	3.50	0.0000	122.00	No Ice	17.36	7.50	0.13
(AT&T)			-6.00			1/2" Ice	17.99	8.09	0.22
			0.00			1" Ice	18.63	8.69	0.32
7770.00	B	From Face	3.50	0.0000	122.00	No Ice	5.51	2.93	0.04
(AT&T)			-6.00			1/2" Ice	5.87	3.27	0.07
			0.00			1" Ice	6.23	3.63	0.11
HPA-65R-BUU-H6	B	From Face	3.50	0.0000	122.00	No Ice	9.66	6.45	0.05
(AT&T)			-2.00			1/2" Ice	10.13	6.91	0.11
			0.00			1" Ice	10.61	7.38	0.18
QS66512-2	B	From Face	3.50	0.0000	122.00	No Ice	8.13	6.80	0.11
(AT&T)			2.00			1/2" Ice	8.59	7.27	0.17
			0.00			1" Ice	9.05	7.72	0.23
80010965	A	From Face	3.50	0.0000	122.00	No Ice	13.81	5.83	0.11
(AT&T)			-6.00			1/2" Ice	14.35	6.32	0.19
			0.00			1" Ice	14.89	6.82	0.27
7770.00	C	From Face	3.50	0.0000	122.00	No Ice	5.51	2.93	0.04
(AT&T)			-6.00			1/2" Ice	5.87	3.27	0.07
			0.00			1" Ice	6.23	3.63	0.11
HPA-65R-BUU-H6	C	From Face	3.50	0.0000	122.00	No Ice	9.66	6.45	0.05
(AT&T)			-2.00			1/2" Ice	10.13	6.91	0.11
			0.00			1" Ice	10.61	7.38	0.18
QS66512-2	C	From Face	3.50	0.0000	122.00	No Ice	8.13	6.80	0.11
(AT&T)			2.00			1/2" Ice	8.59	7.27	0.17
			0.00			1" Ice	9.05	7.72	0.23
80010965	A	From Face	3.50	0.0000	122.00	No Ice	13.81	5.83	0.11
(AT&T)			-6.00			1/2" Ice	14.35	6.32	0.19
			0.00			1" Ice	14.89	6.82	0.27
(2) LGP21401 TMA	A	From Face	3.50	0.0000	122.00	No Ice	0.82	0.35	0.02
(AT&T)			0.00			1/2" Ice	0.94	0.44	0.02
			0.00			1" Ice	1.06	0.54	0.03
(2) LGP21401 TMA	B	From Face	3.50	0.0000	122.00	No Ice	0.82	0.35	0.02
(AT&T)			0.00			1/2" Ice	0.94	0.44	0.02
			0.00			1" Ice	1.06	0.54	0.03
(2) LGP21401 TMA	C	From Face	3.50	0.0000	122.00	No Ice	0.82	0.35	0.02
(AT&T)			0.00			1/2" Ice	0.94	0.44	0.02
			0.00			1" Ice	1.06	0.54	0.03
(2) RRUS-32	A	From Face	3.00	0.0000	122.00	No Ice	3.31	2.42	0.08
(AT&T)			0.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14
(2) RRUS-32	B	From Face	3.00	0.0000	122.00	No Ice	3.31	2.42	0.08
(AT&T)			0.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) RRUS-32	C	From Face	3.00	0.0000	122.00	No Ice	3.31	2.42	0.08
(AT&T)			0.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14
B14 4478	A	From Face	3.00	0.0000	122.00	No Ice	1.63	0.91	0.06
(AT&T)			0.00			1/2" Ice	1.79	1.03	0.07
			0.00			1" Ice	1.95	1.17	0.09
B14 4478	B	From Face	3.00	0.0000	122.00	No Ice	1.63	0.91	0.06
(AT&T)			0.00			1/2" Ice	1.79	1.03	0.07
			0.00			1" Ice	1.95	1.17	0.09
B14 4478	C	From Face	3.00	0.0000	122.00	No Ice	1.63	0.91	0.06
(AT&T)			0.00			1/2" Ice	1.79	1.03	0.07
			0.00			1" Ice	1.95	1.17	0.09
(2) RRUS-11	A	From Face	0.50	0.0000	120.00	No Ice	2.57	1.07	0.05
(AT&T)			0.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
(2) RRUS-11	B	From Face	0.50	0.0000	120.00	No Ice	2.57	1.07	0.05
(AT&T)			0.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
(2) RRUS-11	C	From Face	0.50	0.0000	120.00	No Ice	2.57	1.07	0.05
(AT&T)			0.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
DC6-48-60-18-8F Surge	A	From Face	0.50	0.0000	120.00	No Ice	1.91	1.91	0.02
Arrestor			0.00			1/2" Ice	2.10	2.10	0.04
(AT&T)			0.00			1" Ice	2.29	2.29	0.06
DC6-48-60-18-8F Surge	B	From Face	0.50	0.0000	120.00	No Ice	1.91	1.91	0.02
Arrestor			0.00			1/2" Ice	2.10	2.10	0.04
(AT&T)			0.00			1" Ice	2.29	2.29	0.06
DC6-48-60-18-8F Surge	C	From Face	0.50	0.0000	120.00	No Ice	1.91	1.91	0.02
Arrestor			0.00			1/2" Ice	2.10	2.10	0.04
(AT&T)			0.00			1" Ice	2.29	2.29	0.06
Valmont Uni-Tri Bracket	C	None		0.0000	120.00	No Ice	1.75	1.75	0.29
(AT&T)						1/2" Ice	1.94	1.94	0.31
						1" Ice	2.13	2.13	0.32
EEI 14-ft Low Profile	C	None		0.0000	122.00	No Ice	16.50	16.50	1.55
Platform						1/2" Ice	20.00	20.00	1.80
(AT&T)						1" Ice	23.50	23.50	2.05
APXVSPP18-C-A20	A	From Face	3.00	0.0000	114.00	No Ice	8.02	5.28	0.06
(Sprint)			-3.00			1/2" Ice	8.48	5.74	0.11
			0.00			1" Ice	8.94	6.20	0.16
APXVTM14	A	From Face	3.00	0.0000	114.00	No Ice	6.34	3.61	0.06
(Sprint)			3.00			1/2" Ice	6.72	3.97	0.10
			0.00			1" Ice	7.10	4.33	0.14
APXVSPP18-C-A20	B	From Face	3.00	0.0000	114.00	No Ice	8.02	5.28	0.06
(Sprint)			-3.00			1/2" Ice	8.48	5.74	0.11
			0.00			1" Ice	8.94	6.20	0.16
APXVTM14	B	From Face	3.00	0.0000	114.00	No Ice	6.34	3.61	0.06
(Sprint)			3.00			1/2" Ice	6.72	3.97	0.10
			0.00			1" Ice	7.10	4.33	0.14
APXVSPP18-C-A20	C	From Face	3.00	0.0000	114.00	No Ice	8.02	5.28	0.06
(Sprint)			-3.00			1/2" Ice	8.48	5.74	0.11
			0.00			1" Ice	8.94	6.20	0.16
APXVTM14	C	From Face	3.00	0.0000	114.00	No Ice	6.34	3.61	0.06
(Sprint)			3.00			1/2" Ice	6.72	3.97	0.10
			0.00			1" Ice	7.10	4.33	0.14
TD-RRH8x20-25	A	From Face	0.50	0.0000	114.00	No Ice	4.05	1.53	0.07
(Sprint)			0.00			1/2" Ice	4.30	1.71	0.10
			0.00			1" Ice	4.56	1.90	0.13

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
TD-RRH8x20-25	B	From Face	0.50	0.0000	114.00	No Ice	4.05	1.53	0.07
(Sprint)			0.00			1/2" Ice	4.30	1.71	0.10
			0.00			1" Ice	4.56	1.90	0.13
TD-RRH8x20-25	C	From Face	0.50	0.0000	114.00	No Ice	4.05	1.53	0.07
(Sprint)			0.00			1/2" Ice	4.30	1.71	0.10
			0.00			1" Ice	4.56	1.90	0.13
(2) FD-RRH 4x45 1900	A	From Face	0.50	0.0000	110.00	No Ice	2.32	2.38	0.06
(Sprint)			0.00			1/2" Ice	2.52	2.59	0.08
			0.00			1" Ice	2.74	2.80	0.11
(2) FD-RRH 4x45 1900	B	From Face	0.50	0.0000	110.00	No Ice	2.32	2.38	0.06
(Sprint)			0.00			1/2" Ice	2.52	2.59	0.08
			0.00			1" Ice	2.74	2.80	0.11
(2) FD-RRH 4x45 1900	C	From Face	0.50	0.0000	110.00	No Ice	2.32	2.38	0.06
(Sprint)			0.00			1/2" Ice	2.52	2.59	0.08
			0.00			1" Ice	2.74	2.80	0.11
FD-RRH 2x50 800	A	From Face	0.50	0.0000	107.00	No Ice	2.06	1.93	0.06
(Sprint)			0.00			1/2" Ice	2.24	2.11	0.09
			0.00			1" Ice	2.43	2.29	0.11
FD-RRH 2x50 800	B	From Face	0.50	0.0000	107.00	No Ice	2.06	1.93	0.06
(Sprint)			0.00			1/2" Ice	2.24	2.11	0.09
			0.00			1" Ice	2.43	2.29	0.11
FD-RRH 2x50 800	C	From Face	0.50	0.0000	107.00	No Ice	2.06	1.93	0.06
(Sprint)			0.00			1/2" Ice	2.24	2.11	0.09
			0.00			1" Ice	2.43	2.29	0.11
EEI 14-ft Low Profile	C	None		0.0000	112.00	No Ice	16.50	16.50	1.55
Platform						1/2" Ice	20.00	20.00	1.80
(Sprint)						1" Ice	23.50	23.50	2.05
AIR21 B2A/B4P	A	From Face	3.50	0.0000	102.00	No Ice	6.05	4.36	0.08
(T-Mobile - Existing)			-6.00			1/2" Ice	6.42	4.70	0.12
			0.00			1" Ice	6.80	5.06	0.17
APXVAARR24-43	A	From Face	3.50	0.0000	102.00	No Ice	20.24	8.89	0.16
(T-Mobile - Proposed)			-2.00			1/2" Ice	20.89	9.49	0.27
			0.00			1" Ice	21.54	10.09	0.39
AIR32	A	From Face	3.50	0.0000	102.00	No Ice	6.51	4.71	0.13
(T-Mobile - Proposed)			6.00			1/2" Ice	6.89	5.07	0.18
			0.00			1" Ice	7.27	5.43	0.23
AIR21 B2A/B4P	B	From Face	3.50	0.0000	102.00	No Ice	6.05	4.36	0.08
(T-Mobile - Existing)			-6.00			1/2" Ice	6.42	4.70	0.12
			0.00			1" Ice	6.80	5.06	0.17
APXVAARR24-43	B	From Face	3.50	0.0000	102.00	No Ice	20.24	8.89	0.16
(T-Mobile - Proposed)			-2.00			1/2" Ice	20.89	9.49	0.27
			0.00			1" Ice	21.54	10.09	0.39
AIR32	B	From Face	3.50	0.0000	102.00	No Ice	6.51	4.71	0.13
(T-Mobile - Proposed)			6.00			1/2" Ice	6.89	5.07	0.18
			0.00			1" Ice	7.27	5.43	0.23
AIR21 B2A/B4P	C	From Face	3.50	0.0000	102.00	No Ice	6.05	4.36	0.08
(T-Mobile - Existing)			-6.00			1/2" Ice	6.42	4.70	0.12
			0.00			1" Ice	6.80	5.06	0.17
APXVAARR24-43	C	From Face	3.50	0.0000	102.00	No Ice	20.24	8.89	0.16
(T-Mobile - Proposed)			-2.00			1/2" Ice	20.89	9.49	0.27
			0.00			1" Ice	21.54	10.09	0.39
AIR32	C	From Face	3.50	0.0000	102.00	No Ice	6.51	4.71	0.13
(T-Mobile - Proposed)			6.00			1/2" Ice	6.89	5.07	0.18
			0.00			1" Ice	7.27	5.43	0.23
KRY 112 TMA	A	From Face	3.50	0.0000	102.00	No Ice	0.78	0.49	0.03
(T-Mobile - Existing)			0.00			1/2" Ice	0.90	0.59	0.03
			0.00			1" Ice	1.03	0.70	0.04

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
KRY 112 TMA	B	From Face	3.50	0.0000	102.00	No Ice	0.78	0.49	0.03
(T-Mobile - Existing)			0.00			1/2" Ice	0.90	0.59	0.03
			0.00			1" Ice	1.03	0.70	0.04
KRY 112 TMA	C	From Face	3.50	0.0000	102.00	No Ice	0.78	0.49	0.03
(T-Mobile - Existing)			0.00			1/2" Ice	0.90	0.59	0.03
			0.00			1" Ice	1.03	0.70	0.04
Radio 4449 B71 B12	A	From Face	3.50	0.0000	102.00	No Ice	1.64	1.29	0.07
(T-Mobile - Proposed)			0.00			1/2" Ice	1.80	1.44	0.09
			0.00			1" Ice	1.97	1.59	0.11
Radio 4449 B71 B12	B	From Face	3.50	0.0000	102.00	No Ice	1.64	1.29	0.07
(T-Mobile - Proposed)			0.00			1/2" Ice	1.80	1.44	0.09
			0.00			1" Ice	1.97	1.59	0.11
Radio 4449 B71 B12	C	From Face	3.50	0.0000	102.00	No Ice	1.64	1.29	0.07
(T-Mobile - Proposed)			0.00			1/2" Ice	1.80	1.44	0.09
			0.00			1" Ice	1.97	1.59	0.11
EEI 14-ft Low Profile	C	None		0.0000	102.00	No Ice	16.50	16.50	1.55
Platform						1/2" Ice	20.00	20.00	1.80
(T-Mobile - Existing)						1" Ice	23.50	23.50	2.05
X7C-FRO-660-VRO	A	From Face	3.50	0.0000	95.00	No Ice	9.55	5.87	0.04
(Verizon)			-6.00			1/2" Ice	10.02	6.32	0.09
			0.00			1" Ice	10.50	6.79	0.16
WWX063X19G00	A	From Face	3.50	0.0000	95.00	No Ice	8.60	5.56	0.04
(Verizon)			-2.00			1/2" Ice	9.07	6.03	0.09
			0.00			1" Ice	9.55	6.50	0.15
BXA-80063-6CF	A	From Face	3.50	0.0000	95.00	No Ice	7.57	4.16	0.02
(Verizon)			2.00			1/2" Ice	8.02	4.60	0.06
			0.00			1" Ice	8.47	5.04	0.11
WWX063X19G00	A	From Face	3.50	0.0000	95.00	No Ice	8.60	5.56	0.04
(Verizon)			6.00			1/2" Ice	9.07	6.03	0.09
			0.00			1" Ice	9.55	6.50	0.15
800-10736	B	From Face	3.50	0.0000	95.00	No Ice	11.39	5.17	0.04
(Verizon)			-6.00			1/2" Ice	12.01	5.74	0.10
			0.00			1" Ice	12.63	6.32	0.16
WWX063X19G00	B	From Face	3.50	0.0000	95.00	No Ice	8.60	5.56	0.04
(Verizon)			-2.00			1/2" Ice	9.07	6.03	0.09
			0.00			1" Ice	9.55	6.50	0.15
BXA-80080-6CF	B	From Face	3.50	0.0000	95.00	No Ice	5.77	4.56	0.02
(Verizon)			2.00			1/2" Ice	6.22	5.00	0.05
			0.00			1" Ice	6.68	5.45	0.10
WWX063X19G00	B	From Face	3.50	0.0000	95.00	No Ice	8.60	5.56	0.04
(Verizon)			6.00			1/2" Ice	9.07	6.03	0.09
			0.00			1" Ice	9.55	6.50	0.15
800-10736	B	From Face	3.50	0.0000	95.00	No Ice	11.39	5.17	0.04
(Verizon)			-6.00			1/2" Ice	12.01	5.74	0.10
			0.00			1" Ice	12.63	6.32	0.16
WWX063X19G00	C	From Face	3.50	0.0000	95.00	No Ice	8.60	5.56	0.04
(Verizon)			-2.00			1/2" Ice	9.07	6.03	0.09
			0.00			1" Ice	9.55	6.50	0.15
BXA-80080-6CF	C	From Face	3.50	0.0000	95.00	No Ice	5.77	4.56	0.02
(Verizon)			2.00			1/2" Ice	6.22	5.00	0.05
			0.00			1" Ice	6.68	5.45	0.10
WWX063X19G00	C	From Face	3.50	0.0000	95.00	No Ice	8.60	5.56	0.04
(Verizon)			6.00			1/2" Ice	9.07	6.03	0.09
			0.00			1" Ice	9.55	6.50	0.15
RRH2x60-07-U	A	From Face	2.50	0.0000	95.00	No Ice	2.10	1.41	0.05
(Verizon)			-6.00			1/2" Ice	2.29	1.56	0.07
			0.00			1" Ice	2.48	1.74	0.09

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
RRH2x60-07-U	B	From Face	2.50	0.0000	95.00	No Ice	2.10	1.41	0.05
(Verizon)			-6.00			1/2" Ice	2.29	1.56	0.07
			0.00			1" Ice	2.48	1.74	0.09
RRH2x60-07-U	C	From Face	2.50	0.0000	95.00	No Ice	2.10	1.41	0.05
(Verizon)			-6.00			1/2" Ice	2.29	1.56	0.07
			0.00			1" Ice	2.48	1.74	0.09
RRH2x60-AWS	A	From Face	2.50	0.0000	95.00	No Ice	3.36	2.03	0.06
(Verizon)			-2.00			1/2" Ice	3.61	2.26	0.08
			0.00			1" Ice	3.88	2.50	0.11
RRH2x60-AWS	B	From Face	2.50	0.0000	95.00	No Ice	3.36	2.03	0.06
(Verizon)			-2.00			1/2" Ice	3.61	2.26	0.08
			0.00			1" Ice	3.88	2.50	0.11
RRH2x60-AWS	C	From Face	2.50	0.0000	95.00	No Ice	3.36	2.03	0.06
(Verizon)			-2.00			1/2" Ice	3.61	2.26	0.08
			0.00			1" Ice	3.88	2.50	0.11
RRH2x60-PCS	A	From Face	2.50	0.0000	95.00	No Ice	2.15	1.35	0.06
(Verizon)			2.00			1/2" Ice	2.34	1.50	0.07
			0.00			1" Ice	2.54	1.67	0.09
RRH2x60-PCS	B	From Face	2.50	0.0000	95.00	No Ice	2.15	1.35	0.06
(Verizon)			2.00			1/2" Ice	2.34	1.50	0.07
			0.00			1" Ice	2.54	1.67	0.09
RRH2x60-PCS	C	From Face	2.50	0.0000	95.00	No Ice	2.15	1.35	0.06
(Verizon)			2.00			1/2" Ice	2.34	1.50	0.07
			0.00			1" Ice	2.54	1.67	0.09
DB-T1-6Z-8AB-0Z	B	From Face	0.50	0.0000	95.00	No Ice	4.80	2.00	0.04
(Verizon)			0.00			1/2" Ice	5.07	2.19	0.08
			0.00			1" Ice	5.35	2.39	0.12
DB-T1-6Z-8AB-0Z	C	From Face	0.50	0.0000	95.00	No Ice	4.80	2.00	0.04
(Verizon)			0.00			1/2" Ice	5.07	2.19	0.08
			0.00			1" Ice	5.35	2.39	0.12
EEI 14-ft Low Profile Platform	C	None		0.0000	92.00	No Ice	16.50	16.50	1.55
(Verizon)						1/2" Ice	20.00	20.00	1.80
						1" Ice	23.50	23.50	2.05
18' x 4" Dia Omni	A	From Face	3.50	0.0000	92.00	No Ice	6.16	6.16	0.05
(Town - Existing)			0.00			1/2" Ice	9.04	9.04	0.10
			9.00			1" Ice	10.90	10.90	0.16
18' x 4" Dia Omni	B	From Face	3.50	0.0000	92.00	No Ice	6.16	6.16	0.05
(Town - Existing)			0.00			1/2" Ice	9.04	9.04	0.10
			9.00			1" Ice	10.90	10.90	0.16
EEI 14-ft Low Profile Platform	C	None		0.0000	82.00	No Ice	16.50	16.50	1.55
(Town - Existing)						1/2" Ice	20.00	20.00	1.80
						1" Ice	23.50	23.50	2.05
EEI 14-ft Low Profile Platform	C	None		0.0000	72.00	No Ice	16.50	16.50	1.55
(Town - Existing)						1/2" Ice	20.00	20.00	1.80
						1" Ice	23.50	23.50	2.05
ANT150D6-9	A	From Face	3.50	0.0000	72.00	No Ice	4.00	4.00	0.03
(Town - Existing)			0.00			1/2" Ice	4.60	4.60	0.03
			-10.00			1" Ice	5.20	5.20	0.04

Tower Pressures - No Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1	109.56	1.014	31	55.015	A	0.000	55.015	55.015	100.00	0.000	0.000
125.00-96.04					B	0.000	55.015		100.00	0.000	0.000
					C	0.000	55.015		100.00	0.000	0.000
L2 96.04-47.67	70.19	0.893	30	138.755	A	0.000	138.755	138.755	100.00	0.000	0.000
					B	0.000	138.755		100.00	0.000	0.000
					C	0.000	138.755		100.00	0.000	0.000
L3 47.67-1.00	22.86	0.7	29	189.108	A	0.000	189.108	189.108	100.00	0.000	0.000
					B	0.000	189.108		100.00	0.000	0.000
					C	0.000	189.108		100.00	0.000	0.000

Tower Pressure - With Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 125.00-96.04	109.56	1.014	9	1.9198	64.282	A	0.000	64.282	64.282	100.00	0.000	0.000
						B	0.000	64.282		100.00	0.000	0.000
						C	0.000	64.282		100.00	0.000	0.000
L2 96.04-47.67	70.19	0.893	9	1.9143	154.233	A	0.000	154.233	154.233	100.00	0.000	0.000
						B	0.000	154.233		100.00	0.000	0.000
						C	0.000	154.233		100.00	0.000	0.000
L3 47.67-1.00	22.86	0.7	9	1.8275	203.998	A	0.000	203.998	203.998	100.00	0.000	0.000
						B	0.000	203.998		100.00	0.000	0.000
						C	0.000	203.998		100.00	0.000	0.000

Tower Pressure - Service

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1	109.56	1.014	11	55.015	A	0.000	55.015	55.015	100.00	0.000	0.000
125.00-96.04					B	0.000	55.015		100.00	0.000	0.000
					C	0.000	55.015		100.00	0.000	0.000
L2 96.04-47.67	70.19	0.893	11	138.755	A	0.000	138.755	138.755	100.00	0.000	0.000
					B	0.000	138.755		100.00	0.000	0.000
					C	0.000	138.755		100.00	0.000	0.000
L3 47.67-1.00	22.86	0.7	11	189.108	A	0.000	189.108	189.108	100.00	0.000	0.000
					B	0.000	189.108		100.00	0.000	0.000
					C	0.000	189.108		100.00	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1	0.70	1.31	A	1	0.65	31	1	1	55.015	1.21	41.63	C
125.00-96.04			B	1	0.65		1	1	55.015			
			C	1	0.65		1	1	55.015			
L2	2.88	4.67	A	1	0.65	30	1	1	138.755	3.01	62.19	C
96.04-47.67			B	1	0.65		1	1	138.755			
			C	1	0.65		1	1	138.755			
L3 47.67-1.00	2.76	8.25	A	1	0.65	29	1	1	189.108	3.98	85.32	C
			B	1	0.65		1	1	189.108			
			C	1	0.65		1	1	189.108			
Sum Weight:	6.33	14.22						OTM	426.06 kip-ft	8.20		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1	0.70	1.31	A	1	0.65	31	1	1	55.015	1.21	41.63	C
125.00-96.04			B	1	0.65		1	1	55.015			
			C	1	0.65		1	1	55.015			
L2	2.88	4.67	A	1	0.65	30	1	1	138.755	3.01	62.19	C
96.04-47.67			B	1	0.65		1	1	138.755			
			C	1	0.65		1	1	138.755			
L3 47.67-1.00	2.76	8.25	A	1	0.65	29	1	1	189.108	3.98	85.32	C
			B	1	0.65		1	1	189.108			
			C	1	0.65		1	1	189.108			
Sum Weight:	6.33	14.22						OTM	426.06 kip-ft	8.20		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1	0.70	1.31	A	1	0.65	31	1	1	55.015	1.21	41.63	C
125.00-96.04			B	1	0.65		1	1	55.015			
			C	1	0.65		1	1	55.015			
L2	2.88	4.67	A	1	0.65	30	1	1	138.755	3.01	62.19	C
96.04-47.67			B	1	0.65		1	1	138.755			
			C	1	0.65		1	1	138.755			
L3 47.67-1.00	2.76	8.25	A	1	0.65	29	1	1	189.108	3.98	85.32	C
			B	1	0.65		1	1	189.108			
			C	1	0.65		1	1	189.108			
Sum Weight:	6.33	14.22						OTM	426.06 kip-ft	8.20		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1	0.70	1.31	A	1	0.65	31	1	1	55.015	1.21	41.63	C
125.00-96.04			B	1	0.65		1	1	55.015			
			C	1	0.65		1	1	55.015			
L2	2.88	4.67	A	1	0.65	30	1	1	138.755	3.01	62.19	C
96.04-47.67			B	1	0.65		1	1	138.755			
			C	1	0.65		1	1	138.755			
L3 47.67-1.00	2.76	8.25	A	1	0.65	29	1	1	189.108	3.98	85.32	C
			B	1	0.65		1	1	189.108			
			C	1	0.65		1	1	189.108			
Sum Weight:	6.33	14.22						OTM	426.06 kip-ft	8.20		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1	0.70	2.98	A	1	1.2	9	1	1	64.282	0.75	25.96	C
125.00-96.04			B	1	1.2		1	1	64.282			
			C	1	1.2		1	1	64.282			
L2	2.88	8.76	A	1	1.2	9	1	1	154.233	1.78	36.89	C
96.04-47.67			B	1	1.2		1	1	154.233			
			C	1	1.2		1	1	154.233			
L3 47.67-1.00	2.76	13.48	A	1	1.2	9	1	1	203.998	2.29	49.11	C
			B	1	1.2		1	1	203.998			
			C	1	1.2		1	1	203.998			
Sum Weight:	6.33	25.22						OTM	255.17 kip-ft	4.83		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1	0.70	2.98	A	1	1.2	9	1	1	64.282	0.75	25.96	C
125.00-96.04			B	1	1.2		1	1	64.282			
			C	1	1.2		1	1	64.282			
L2	2.88	8.76	A	1	1.2	9	1	1	154.233	1.78	36.89	C
96.04-47.67			B	1	1.2		1	1	154.233			
			C	1	1.2		1	1	154.233			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L3 47.67-1.00	2.76	13.48	A	1	1.2	9	1	1	203.998	2.29	49.11	C
			B	1	1.2		1	1	203.998			
			C	1	1.2		1	1	203.998			
Sum Weight:	6.33	25.22						OTM	255.17 kip-ft	4.83		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1	0.70	2.98	A	1	1.2	9	1	1	64.282	0.75	25.96	C
125.00-96.04			B	1	1.2		1	1	64.282			
			C	1	1.2		1	1	64.282			
L2	2.88	8.76	A	1	1.2	9	1	1	154.233	1.78	36.89	C
96.04-47.67			B	1	1.2		1	1	154.233			
			C	1	1.2		1	1	154.233			
L3 47.67-1.00	2.76	13.48	A	1	1.2	9	1	1	203.998	2.29	49.11	C
			B	1	1.2		1	1	203.998			
			C	1	1.2		1	1	203.998			
Sum Weight:	6.33	25.22						OTM	255.17 kip-ft	4.83		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1	0.70	2.98	A	1	1.2	9	1	1	64.282	0.75	25.96	C
125.00-96.04			B	1	1.2		1	1	64.282			
			C	1	1.2		1	1	64.282			
L2	2.88	8.76	A	1	1.2	9	1	1	154.233	1.78	36.89	C
96.04-47.67			B	1	1.2		1	1	154.233			
			C	1	1.2		1	1	154.233			
L3 47.67-1.00	2.76	13.48	A	1	1.2	9	1	1	203.998	2.29	49.11	C
			B	1	1.2		1	1	203.998			
			C	1	1.2		1	1	203.998			
Sum Weight:	6.33	25.22						OTM	255.17 kip-ft	4.83		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1	0.70	1.31	A	1	0.65	11	1	1	55.015	0.45	15.50	C
125.00-96.04			B	1	0.65		1	1	55.015			
			C	1	0.65		1	1	55.015			
L2	2.88	4.67	A	1	0.65	11	1	1	138.755	1.12	23.16	C
96.04-47.67			B	1	0.65		1	1	138.755			
			C	1	0.65		1	1	138.755			
L3 47.67-1.00	2.76	8.25	A	1	0.65	11	1	1	189.108	1.48	31.77	C
			B	1	0.65		1	1	189.108			
			C	1	0.65		1	1	189.108			
Sum Weight:	6.33	14.22						OTM	158.67 kip-ft	3.05		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1	0.70	1.31	A	1	0.65	11	1	1	55.015	0.45	15.50	C
125.00-96.04			B	1	0.65		1	1	55.015			
			C	1	0.65		1	1	55.015			
L2	2.88	4.67	A	1	0.65	11	1	1	138.755	1.12	23.16	C
96.04-47.67			B	1	0.65		1	1	138.755			
			C	1	0.65		1	1	138.755			
L3 47.67-1.00	2.76	8.25	A	1	0.65	11	1	1	189.108	1.48	31.77	C
			B	1	0.65		1	1	189.108			
			C	1	0.65		1	1	189.108			
Sum Weight:	6.33	14.22						OTM	158.67 kip-ft	3.05		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1	0.70	1.31	A	1	0.65	11	1	1	55.015	0.45	15.50	C
125.00-96.04			B	1	0.65		1	1	55.015			
			C	1	0.65		1	1	55.015			
L2	2.88	4.67	A	1	0.65	11	1	1	138.755	1.12	23.16	C
96.04-47.67			B	1	0.65		1	1	138.755			
			C	1	0.65		1	1	138.755			
L3 47.67-1.00	2.76	8.25	A	1	0.65	11	1	1	189.108	1.48	31.77	C
			B	1	0.65		1	1	189.108			
			C	1	0.65		1	1	189.108			
Sum Weight:	6.33	14.22						OTM	158.67 kip-ft	3.05		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1	0.70	1.31	A	1	0.65	11	1	1	55.015	0.45	15.50	C
125.00-96.04			B	1	0.65		1	1	55.015			
			C	1	0.65		1	1	55.015			
L2	2.88	4.67	A	1	0.65	11	1	1	138.755	1.12	23.16	C
96.04-47.67			B	1	0.65		1	1	138.755			
			C	1	0.65		1	1	138.755			
L3 47.67-1.00	2.76	8.25	A	1	0.65	11	1	1	189.108	1.48	31.77	C
			B	1	0.65		1	1	189.108			
			C	1	0.65		1	1	189.108			
Sum Weight:	6.33	14.22						OTM	158.67 kip-ft	3.05		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	14.22					
Bracing Weight	0.00					
Total Member Self-Weight	14.22			0.26	2.90	
Total Weight	35.97			0.26	2.90	
Wind 0 deg - No Ice		-0.27	-22.31	-1904.22	38.73	-9.21
Wind 30 deg - No Ice		11.24	-19.18	-1631.16	-954.77	-7.84
Wind 45 deg - No Ice		16.04	-15.58	-1321.08	-1369.99	-6.33
Wind 60 deg - No Ice		19.74	-10.92	-920.96	-1691.66	-4.38
Wind 90 deg - No Ice		22.96	0.27	36.08	-1974.49	0.26
Wind 120 deg - No Ice		20.02	11.39	983.53	-1727.48	4.83
Wind 135 deg - No Ice		16.42	15.96	1372.27	-1420.65	6.69
Wind 150 deg - No Ice		11.71	19.45	1667.50	-1016.82	8.10
Wind 180 deg - No Ice		0.27	22.31	1904.75	-32.92	9.21
Wind 210 deg - No Ice		-11.24	19.18	1631.68	960.58	7.84
Wind 225 deg - No Ice		-16.04	15.58	1321.60	1375.80	6.33
Wind 240 deg - No Ice		-19.74	10.92	921.48	1697.46	4.38
Wind 270 deg - No Ice		-22.96	-0.27	-35.56	1980.30	-0.26
Wind 300 deg - No Ice		-20.02	-11.39	-983.00	1733.29	-4.83
Wind 315 deg - No Ice		-16.42	-15.96	-1371.74	1426.46	-6.69
Wind 330 deg - No Ice		-11.71	-19.45	-1666.98	1022.62	-8.10
Member Ice	11.00					
Total Weight Ice	68.44			-1.86	13.08	
Wind 0 deg - Ice		-0.08	-10.72	-871.14	23.94	-3.52
Wind 30 deg - Ice		5.39	-9.25	-749.25	-423.09	-3.36
Wind 45 deg - Ice		7.66	-7.53	-608.86	-609.38	-2.93
Wind 60 deg - Ice		9.41	-5.29	-427.10	-753.25	-2.30
Wind 90 deg - Ice		10.92	0.08	9.00	-878.07	-0.62
Wind 120 deg - Ice		9.50	5.43	442.18	-764.11	1.22
Wind 135 deg - Ice		7.78	7.64	620.49	-624.74	2.05
Wind 150 deg - Ice		5.53	9.33	756.39	-441.90	2.74

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 180 deg - Ice		0.08	10.72	867.42	2.22	3.52
Wind 210 deg - Ice		-5.39	9.25	745.53	449.25	3.36
Wind 225 deg - Ice		-7.66	7.53	605.13	635.54	2.93
Wind 240 deg - Ice		-9.41	5.29	423.38	779.41	2.30
Wind 270 deg - Ice		-10.92	-0.08	-12.72	904.23	0.62
Wind 300 deg - Ice		-9.50	-5.43	-445.90	790.27	-1.22
Wind 315 deg - Ice		-7.78	-7.64	-624.21	650.90	-2.05
Wind 330 deg - Ice		-5.53	-9.33	-760.11	468.06	-2.74
Total Weight	35.97			0.26	2.90	
Wind 0 deg - Service		-0.10	-8.31	-709.00	16.24	-3.43
Wind 30 deg - Service		4.19	-7.14	-607.31	-353.75	-2.92
Wind 45 deg - Service		5.97	-5.80	-491.83	-508.39	-2.36
Wind 60 deg - Service		7.35	-4.07	-342.82	-628.18	-1.63
Wind 90 deg - Service		8.55	0.10	13.60	-733.51	0.10
Wind 120 deg - Service		7.45	4.24	366.45	-641.52	1.80
Wind 135 deg - Service		6.12	5.95	511.22	-527.26	2.49
Wind 150 deg - Service		4.36	7.24	621.17	-376.86	3.02
Wind 180 deg - Service		0.10	8.31	709.53	-10.44	3.43
Wind 210 deg - Service		-4.19	7.14	607.83	359.56	2.92
Wind 225 deg - Service		-5.97	5.80	492.35	514.20	2.36
Wind 240 deg - Service		-7.35	4.07	343.34	633.99	1.63
Wind 270 deg - Service		-8.55	-0.10	-13.08	739.32	-0.10
Wind 300 deg - Service		-7.45	-4.24	-365.93	647.33	-1.80
Wind 315 deg - Service		-6.12	-5.95	-510.70	533.06	-2.49
Wind 330 deg - Service		-4.36	-7.24	-620.65	382.67	-3.02

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 45 deg - No Ice
7	0.9 Dead+1.6 Wind 45 deg - No Ice
8	1.2 Dead+1.6 Wind 60 deg - No Ice
9	0.9 Dead+1.6 Wind 60 deg - No Ice
10	1.2 Dead+1.6 Wind 90 deg - No Ice
11	0.9 Dead+1.6 Wind 90 deg - No Ice
12	1.2 Dead+1.6 Wind 120 deg - No Ice
13	0.9 Dead+1.6 Wind 120 deg - No Ice
14	1.2 Dead+1.6 Wind 135 deg - No Ice
15	0.9 Dead+1.6 Wind 135 deg - No Ice
16	1.2 Dead+1.6 Wind 150 deg - No Ice
17	0.9 Dead+1.6 Wind 150 deg - No Ice
18	1.2 Dead+1.6 Wind 180 deg - No Ice
19	0.9 Dead+1.6 Wind 180 deg - No Ice
20	1.2 Dead+1.6 Wind 210 deg - No Ice
21	0.9 Dead+1.6 Wind 210 deg - No Ice
22	1.2 Dead+1.6 Wind 225 deg - No Ice
23	0.9 Dead+1.6 Wind 225 deg - No Ice
24	1.2 Dead+1.6 Wind 240 deg - No Ice
25	0.9 Dead+1.6 Wind 240 deg - No Ice
26	1.2 Dead+1.6 Wind 270 deg - No Ice

Comb. No.	Description
27	0.9 Dead+1.6 Wind 270 deg - No Ice
28	1.2 Dead+1.6 Wind 300 deg - No Ice
29	0.9 Dead+1.6 Wind 300 deg - No Ice
30	1.2 Dead+1.6 Wind 315 deg - No Ice
31	0.9 Dead+1.6 Wind 315 deg - No Ice
32	1.2 Dead+1.6 Wind 330 deg - No Ice
33	0.9 Dead+1.6 Wind 330 deg - No Ice
34	1.2 Dead+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
39	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
40	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
41	1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp
42	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
43	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
44	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
45	1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp
46	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
47	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
48	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
49	1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp
50	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
51	Dead+Wind 0 deg - Service
52	Dead+Wind 30 deg - Service
53	Dead+Wind 45 deg - Service
54	Dead+Wind 60 deg - Service
55	Dead+Wind 90 deg - Service
56	Dead+Wind 120 deg - Service
57	Dead+Wind 135 deg - Service
58	Dead+Wind 150 deg - Service
59	Dead+Wind 180 deg - Service
60	Dead+Wind 210 deg - Service
61	Dead+Wind 225 deg - Service
62	Dead+Wind 240 deg - Service
63	Dead+Wind 270 deg - Service
64	Dead+Wind 300 deg - Service
65	Dead+Wind 315 deg - Service
66	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	125 - 96.04	Pole	Max Tension	39	0.00	0.00	0.00
			Max. Compression	34	-29.12	12.86	-3.44
			Max. Mx	26	-11.82	261.78	13.39
			Max. My	18	-11.97	-11.38	-243.60
			Max. Vy	26	-18.35	261.78	13.39
			Max. Vx	18	17.59	-11.38	-243.60
			Max. Torque	17			-12.67
L2	96.04 - 47.667	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	34	-55.90	15.98	1.97
			Max. Mx	26	-27.37	1528.39	36.38
			Max. My	18	-27.48	-33.23	-1459.42
			Max. Vy	26	-31.01	1528.39	36.38
			Max. Vx	18	29.92	-33.23	-1459.42

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Torque	3			14.56
L3	47.667 - 1	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	34	-76.60	16.39	2.02
			Max. Mx	26	-43.12	3294.27	59.89
			Max. My	18	-43.12	-56.62	-3169.41
			Max. Vy	26	-36.77	3294.27	59.89
			Max. Vx	18	35.73	-56.62	-3169.41
			Max. Torque	3			14.52

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	48	76.60	9.50	5.43
	Max. H_x	26	43.16	36.73	0.43
	Max. H_z	2	43.16	0.43	35.69
	Max. M_x	2	3168.73	0.43	35.69
	Max. M_z	10	3286.80	-36.73	-0.43
	Max. Torsion	3	14.50	0.43	35.69
	Min. Vert	23	32.37	25.66	-24.93
	Min. H_x	10	43.16	-36.73	-0.43
	Min. H_z	18	43.16	-0.43	-35.69
	Min. M_x	18	-3169.41	-0.43	-35.69
	Min. M_z	26	-3294.27	36.73	0.43
	Min. Torsion	19	-14.48	-0.43	-35.69

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	35.97	-0.00	0.00	0.28	3.05	-0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	43.16	-0.43	-35.69	-3168.73	63.85	-14.47
0.9 Dead+1.6 Wind 0 deg - No Ice	32.37	-0.43	-35.69	-3136.02	62.09	-14.50
1.2 Dead+1.6 Wind 30 deg - No Ice	43.16	17.99	-30.69	-2714.08	-1589.75	-12.34
0.9 Dead+1.6 Wind 30 deg - No Ice	32.37	17.99	-30.69	-2686.17	-1574.29	-12.36
1.2 Dead+1.6 Wind 45 deg - No Ice	43.16	25.66	-24.93	-2197.90	-2280.85	-9.95
0.9 Dead+1.6 Wind 45 deg - No Ice	32.37	25.66	-24.93	-2175.37	-2258.18	-9.97
1.2 Dead+1.6 Wind 60 deg - No Ice	43.16	31.59	-17.47	-1531.92	-2816.17	-6.89
0.9 Dead+1.6 Wind 60 deg - No Ice	32.37	31.59	-17.47	-1516.32	-2787.92	-6.90
1.2 Dead+1.6 Wind 90 deg - No Ice	43.16	36.73	0.43	60.55	-3286.80	0.39
0.9 Dead+1.6 Wind 90 deg - No Ice	32.37	36.73	0.43	59.67	-3253.59	0.39

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
1.2 Dead+1.6 Wind 120 deg - No Ice	43.16	32.02	18.22	1636.67	-2876.00	7.56
0.9 Dead+1.6 Wind 120 deg - No Ice	32.37	32.02	18.22	1619.53	-2846.97	7.57
1.2 Dead+1.6 Wind 135 deg - No Ice	43.16	26.28	25.54	2283.37	-2365.65	10.48
0.9 Dead+1.6 Wind 135 deg - No Ice	32.37	26.28	25.54	2259.56	-2341.88	10.50
1.2 Dead+1.6 Wind 150 deg - No Ice	43.16	18.74	31.13	2774.59	-1693.85	12.70
0.9 Dead+1.6 Wind 150 deg - No Ice	32.37	18.74	31.13	2745.73	-1677.02	12.72
1.2 Dead+1.6 Wind 180 deg - No Ice	43.16	0.43	35.69	3169.41	-56.62	14.46
0.9 Dead+1.6 Wind 180 deg - No Ice	32.37	0.43	35.69	3136.52	-56.79	14.48
1.2 Dead+1.6 Wind 210 deg - No Ice	43.16	-17.99	30.69	2714.88	1597.06	12.34
0.9 Dead+1.6 Wind 210 deg - No Ice	32.37	-17.99	30.69	2686.75	1579.65	12.36
1.2 Dead+1.6 Wind 225 deg - No Ice	43.16	-25.66	24.93	2198.71	2288.22	9.96
0.9 Dead+1.6 Wind 225 deg - No Ice	32.37	-25.66	24.93	2175.97	2263.60	9.97
1.2 Dead+1.6 Wind 240 deg - No Ice	43.16	-31.59	17.47	1532.71	2823.60	6.90
0.9 Dead+1.6 Wind 240 deg - No Ice	32.37	-31.59	17.47	1516.89	2793.37	6.91
1.2 Dead+1.6 Wind 270 deg - No Ice	43.16	-36.73	-0.43	-59.89	3294.27	-0.38
0.9 Dead+1.6 Wind 270 deg - No Ice	32.37	-36.73	-0.43	-59.19	3259.08	-0.38
1.2 Dead+1.6 Wind 300 deg - No Ice	43.16	-32.02	-18.22	-1636.12	2883.39	-7.55
0.9 Dead+1.6 Wind 300 deg - No Ice	32.37	-32.02	-18.22	-1619.13	2852.39	-7.56
1.2 Dead+1.6 Wind 315 deg - No Ice	43.16	-26.28	-25.54	-2282.83	2372.98	-10.49
0.9 Dead+1.6 Wind 315 deg - No Ice	32.37	-26.28	-25.54	-2259.17	2347.26	-10.51
1.2 Dead+1.6 Wind 330 deg - No Ice	43.16	-18.74	-31.13	-2774.03	1701.12	-12.71
0.9 Dead+1.6 Wind 330 deg - No Ice	32.37	-18.74	-31.13	-2745.32	1682.36	-12.73
1.2 Dead+1.0 Ice+1.0 Temp	76.60	-0.00	-0.00	-2.02	16.39	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	76.60	-0.08	-10.72	-947.88	28.56	-3.43
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	76.60	5.39	-9.25	-815.09	-458.06	-3.27
1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp	76.60	7.66	-7.53	-662.26	-660.88	-2.85
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	76.60	9.41	-5.29	-464.43	-817.54	-2.23
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	76.60	10.92	0.08	10.11	-953.55	-0.59
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	76.60	9.50	5.43	481.40	-829.67	1.20
1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp	76.60	7.78	7.64	675.36	-678.04	2.01
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	76.60	5.53	9.33	823.17	-479.08	2.67

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	76.60	0.08	10.72	943.83	4.28	3.43
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	76.60	-5.39	9.25	811.05	490.91	3.27
1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp	76.60	-7.66	7.53	658.22	693.73	2.85
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	76.60	-9.41	5.29	460.40	850.40	2.23
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	76.60	-10.92	-0.08	-14.16	986.42	0.59
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	76.60	-9.50	-5.43	-485.46	862.53	-1.20
1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp	76.60	-7.78	-7.64	-679.43	710.89	-2.01
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	76.60	-5.53	-9.33	-827.23	511.93	-2.68
Dead+Wind 0 deg - Service	35.97	-0.10	-8.31	-733.29	17.04	-3.41
Dead+Wind 30 deg - Service	35.97	4.19	-7.14	-628.05	-365.72	-2.91
Dead+Wind 45 deg - Service	35.97	5.97	-5.80	-508.58	-525.71	-2.35
Dead+Wind 60 deg - Service	35.97	7.35	-4.07	-354.44	-649.65	-1.62
Dead+Wind 90 deg - Service	35.97	8.55	0.10	14.22	-758.67	0.10
Dead+Wind 120 deg - Service	35.97	7.45	4.24	379.14	-663.58	1.79
Dead+Wind 135 deg - Service	35.97	6.12	5.95	528.85	-545.40	2.48
Dead+Wind 150 deg - Service	35.97	4.36	7.24	642.55	-389.85	3.00
Dead+Wind 180 deg - Service	35.97	0.10	8.31	733.87	-10.82	3.41
Dead+Wind 210 deg - Service	35.97	-4.19	7.14	628.63	371.95	2.91
Dead+Wind 225 deg - Service	35.97	-5.97	5.80	509.17	531.94	2.35
Dead+Wind 240 deg - Service	35.97	-7.35	4.07	355.02	655.89	1.62
Dead+Wind 270 deg - Service	35.97	-8.55	-0.10	-13.64	764.91	-0.10
Dead+Wind 300 deg - Service	35.97	-7.45	-4.24	-378.56	669.81	-1.79
Dead+Wind 315 deg - Service	35.97	-6.12	-5.95	-528.28	551.63	-2.48
Dead+Wind 330 deg - Service	35.97	-4.36	-7.24	-641.98	396.07	-3.00

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-35.97	0.00	0.00	35.97	0.00	0.000%
2	-0.43	-43.16	-35.69	0.43	43.16	35.69	0.000%
3	-0.43	-32.37	-35.69	0.43	32.37	35.69	0.000%
4	17.99	-43.16	-30.69	-17.99	43.16	30.69	0.000%
5	17.99	-32.37	-30.69	-17.99	32.37	30.69	0.000%
6	25.66	-43.16	-24.93	-25.66	43.16	24.93	0.000%
7	25.66	-32.37	-24.93	-25.66	32.37	24.93	0.000%
8	31.59	-43.16	-17.47	-31.59	43.16	17.47	0.000%
9	31.59	-32.37	-17.47	-31.59	32.37	17.47	0.000%
10	36.73	-43.16	0.43	-36.73	43.16	-0.43	0.000%
11	36.73	-32.37	0.43	-36.73	32.37	-0.43	0.000%
12	32.02	-43.16	18.22	-32.02	43.16	-18.22	0.000%
13	32.02	-32.37	18.22	-32.02	32.37	-18.22	0.000%
14	26.28	-43.16	25.54	-26.28	43.16	-25.54	0.000%
15	26.28	-32.37	25.54	-26.28	32.37	-25.54	0.000%
16	18.74	-43.16	31.13	-18.74	43.16	-31.13	0.000%
17	18.74	-32.37	31.13	-18.74	32.37	-31.13	0.000%
18	0.43	-43.16	35.69	-0.43	43.16	-35.69	0.000%
19	0.43	-32.37	35.69	-0.43	32.37	-35.69	0.000%
20	-17.99	-43.16	30.69	17.99	43.16	-30.69	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
21	-17.99	-32.37	30.69	17.99	32.37	-30.69	0.000%
22	-25.66	-43.16	24.93	25.66	43.16	-24.93	0.000%
23	-25.66	-32.37	24.93	25.66	32.37	-24.93	0.000%
24	-31.59	-43.16	17.47	31.59	43.16	-17.47	0.000%
25	-31.59	-32.37	17.47	31.59	32.37	-17.47	0.000%
26	-36.73	-43.16	-0.43	36.73	43.16	0.43	0.000%
27	-36.73	-32.37	-0.43	36.73	32.37	0.43	0.000%
28	-32.02	-43.16	-18.22	32.02	43.16	18.22	0.000%
29	-32.02	-32.37	-18.22	32.02	32.37	18.22	0.000%
30	-26.28	-43.16	-25.54	26.28	43.16	25.54	0.000%
31	-26.28	-32.37	-25.54	26.28	32.37	25.54	0.000%
32	-18.74	-43.16	-31.13	18.74	43.16	31.13	0.000%
33	-18.74	-32.37	-31.13	18.74	32.37	31.13	0.000%
34	0.00	-76.60	0.00	0.00	76.60	0.00	0.000%
35	-0.08	-76.60	-10.72	0.08	76.60	10.72	0.000%
36	5.39	-76.60	-9.25	-5.39	76.60	9.25	0.000%
37	7.66	-76.60	-7.53	-7.66	76.60	7.53	0.000%
38	9.41	-76.60	-5.29	-9.41	76.60	5.29	0.000%
39	10.92	-76.60	0.08	-10.92	76.60	-0.08	0.000%
40	9.50	-76.60	5.43	-9.50	76.60	-5.43	0.000%
41	7.78	-76.60	7.64	-7.78	76.60	-7.64	0.000%
42	5.53	-76.60	9.33	-5.53	76.60	-9.33	0.000%
43	0.08	-76.60	10.72	-0.08	76.60	-10.72	0.000%
44	-5.39	-76.60	9.25	5.39	76.60	-9.25	0.000%
45	-7.66	-76.60	7.53	7.66	76.60	-7.53	0.000%
46	-9.41	-76.60	5.29	9.41	76.60	-5.29	0.000%
47	-10.92	-76.60	-0.08	10.92	76.60	0.08	0.000%
48	-9.50	-76.60	-5.43	9.50	76.60	5.43	0.000%
49	-7.78	-76.60	-7.64	7.78	76.60	7.64	0.000%
50	-5.53	-76.60	-9.33	5.53	76.60	9.33	0.000%
51	-0.10	-35.97	-8.31	0.10	35.97	8.31	0.000%
52	4.19	-35.97	-7.14	-4.19	35.97	7.14	0.000%
53	5.97	-35.97	-5.80	-5.97	35.97	5.80	0.000%
54	7.35	-35.97	-4.07	-7.35	35.97	4.07	0.000%
55	8.55	-35.97	0.10	-8.55	35.97	-0.10	0.000%
56	7.45	-35.97	4.24	-7.45	35.97	-4.24	0.000%
57	6.12	-35.97	5.95	-6.12	35.97	-5.95	0.000%
58	4.36	-35.97	7.24	-4.36	35.97	-7.24	0.000%
59	0.10	-35.97	8.31	-0.10	35.97	-8.31	0.000%
60	-4.19	-35.97	7.14	4.19	35.97	-7.14	0.000%
61	-5.97	-35.97	5.80	5.97	35.97	-5.80	0.000%
62	-7.35	-35.97	4.07	7.35	35.97	-4.07	0.000%
63	-8.55	-35.97	-0.10	8.55	35.97	0.10	0.000%
64	-7.45	-35.97	-4.24	7.45	35.97	4.24	0.000%
65	-6.12	-35.97	-5.95	6.12	35.97	5.95	0.000%
66	-4.36	-35.97	-7.24	4.36	35.97	7.24	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	5	0.00000001	0.00069301
3	Yes	5	0.00000001	0.00031212
4	Yes	5	0.00000001	0.00090634
5	Yes	5	0.00000001	0.00038070

6	Yes	6	0.00000001	0.00005961
7	Yes	5	0.00000001	0.00052140
8	Yes	6	0.00000001	0.00005801
9	Yes	5	0.00000001	0.00050639
10	Yes	5	0.00000001	0.00024332
11	Yes	5	0.00000001	0.00010769
12	Yes	6	0.00000001	0.00007265
13	Yes	5	0.00000001	0.00063715
14	Yes	6	0.00000001	0.00006896
15	Yes	5	0.00000001	0.00060571
16	Yes	6	0.00000001	0.00004996
17	Yes	5	0.00000001	0.00043899
18	Yes	5	0.00000001	0.00056047
19	Yes	5	0.00000001	0.00025428
20	Yes	6	0.00000001	0.00006852
21	Yes	5	0.00000001	0.00060262
22	Yes	6	0.00000001	0.00005805
23	Yes	5	0.00000001	0.00050592
24	Yes	5	0.00000001	0.00097497
25	Yes	5	0.00000001	0.00040457
26	Yes	5	0.00000001	0.00012374
27	Yes	5	0.00000001	0.00005580
28	Yes	6	0.00000001	0.00004789
29	Yes	5	0.00000001	0.00041457
30	Yes	6	0.00000001	0.00006617
31	Yes	5	0.00000001	0.00057993
32	Yes	6	0.00000001	0.00007827
33	Yes	5	0.00000001	0.00068965
34	Yes	4	0.00000001	0.00010396
35	Yes	5	0.00000001	0.00045354
36	Yes	5	0.00000001	0.00044343
37	Yes	5	0.00000001	0.00052323
38	Yes	5	0.00000001	0.00049529
39	Yes	5	0.00000001	0.00027891
40	Yes	5	0.00000001	0.00054566
41	Yes	5	0.00000001	0.00057165
42	Yes	5	0.00000001	0.00048339
43	Yes	5	0.00000001	0.00043561
44	Yes	5	0.00000001	0.00062287
45	Yes	5	0.00000001	0.00058958
46	Yes	5	0.00000001	0.00048283
47	Yes	5	0.00000001	0.00030175
48	Yes	5	0.00000001	0.00052659
49	Yes	5	0.00000001	0.00064387
50	Yes	5	0.00000001	0.00067519
51	Yes	4	0.00000001	0.00087008
52	Yes	4	0.00000001	0.00054018
53	Yes	4	0.00000001	0.00062059
54	Yes	4	0.00000001	0.00053837
55	Yes	4	0.00000001	0.00027224
56	Yes	4	0.00000001	0.00093691
57	Yes	4	0.00000001	0.00094701
58	Yes	4	0.00000001	0.00078910
59	Yes	4	0.00000001	0.00083151
60	Yes	4	0.00000001	0.00086658
61	Yes	4	0.00000001	0.00061807
62	Yes	4	0.00000001	0.00033871
63	Yes	4	0.00000001	0.00023866
64	Yes	4	0.00000001	0.00059760
65	Yes	4	0.00000001	0.00092976
66	Yes	5	0.00000001	0.00005270

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	125 - 96.04	20.780	64	1.5289	0.0509
L2	99.957 - 47.667	13.118	64	1.3306	0.0218
L3	53.334 - 1	3.362	64	0.6110	0.0050

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
124.00	18' x 4" Dia Omni	64	20.462	1.5226	0.0495	21210
122.00	7770.00	64	19.827	1.5099	0.0468	21210
120.00	(2) RRUS-11	64	19.194	1.4970	0.0440	21210
114.00	APXVSPP18-C-A20	64	17.309	1.4559	0.0359	9641
112.00	EEI 14-ft Low Profile Platform	64	16.690	1.4411	0.0334	8157
110.00	(2) FD-RRH 4x45 1900	64	16.077	1.4254	0.0311	7070
107.00	FD-RRH 2x50 800	64	15.170	1.4002	0.0281	5891
102.00	AIR21 B2A/B4P	64	13.700	1.3525	0.0235	4639
95.00	X7C-FRO-660-VRO	64	11.754	1.2711	0.0182	4097
92.00	EEI 14-ft Low Profile Platform	64	10.963	1.2312	0.0162	4018
82.00	EEI 14-ft Low Profile Platform	64	8.524	1.0820	0.0113	3776
72.00	EEI 14-ft Low Profile Platform	64	6.404	0.9171	0.0082	3561

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	125 - 96.04	89.116	28	6.5270	0.2207
L2	99.957 - 47.667	56.399	28	5.7175	0.0946
L3	53.334 - 1	14.486	28	2.6331	0.0215

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
124.00	18' x 4" Dia Omni	28	87.760	6.5018	0.2146	5179
122.00	7770.00	28	85.050	6.4511	0.2026	5179
120.00	(2) RRUS-11	28	82.347	6.3995	0.1906	5179
114.00	APXVSPP18-C-A20	28	74.307	6.2346	0.1556	2353
112.00	EEI 14-ft Low Profile Platform	28	71.664	6.1743	0.1445	1990
110.00	(2) FD-RRH 4x45 1900	28	69.045	6.1105	0.1352	1724
107.00	FD-RRH 2x50 800	28	65.171	6.0070	0.1221	1436
102.00	AIR21 B2A/B4P	28	58.890	5.8092	0.1020	1129

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
95.00	X7C-FRO-660-VRO	28	50.560	5.4670	0.0786	991
92.00	EEI 14-ft Low Profile Platform	28	47.172	5.2979	0.0702	968
82.00	EEI 14-ft Low Profile Platform	28	36.707	4.6607	0.0487	900
72.00	EEI 14-ft Low Profile Platform	28	27.589	3.9527	0.0350	841

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	125 - 96.04 (1)	TP26.9x18x0.1875	28.96	0.00	0.0	15.1809	-11.77	1026.09	0.011
L2	96.04 - 47.667 (2)	TP41.28x25.3212x0.25	52.29	0.00	0.0	31.1849	-27.36	1984.91	0.014
L3	47.667 - 1 (3)	TP55x39.0504x0.3125	52.33	0.00	0.0	54.2432	-43.12	3272.70	0.013

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	125 - 96.04 (1)	TP26.9x18x0.1875	268.71	538.50	0.499	0.00	538.50	0.000
L2	96.04 - 47.667 (2)	TP41.28x25.3212x0.25	1542.94	1606.48	0.960	0.00	1606.48	0.000
L3	47.667 - 1 (3)	TP55x39.0504x0.3125	3315.24	3688.18	0.899	0.00	3688.18	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	125 - 96.04 (1)	TP26.9x18x0.1875	18.71	513.05	0.036	11.33	1078.32	0.011
L2	96.04 - 47.667 (2)	TP41.28x25.3212x0.25	31.14	992.46	0.031	7.57	3216.90	0.002
L3	47.667 - 1 (3)	TP55x39.0504x0.3125	36.89	1636.35	0.023	7.55	7385.38	0.001

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	125 - 96.04 (1)	0.011	0.499	0.000	0.036	0.011	0.513 ✔	1.000	4.8.2 ✔
L2	96.04 - 47.667 (2)	0.014	0.960	0.000	0.031	0.002	0.975 ✔	1.000	4.8.2 ✔
L3	47.667 - 1 (3)	0.013	0.899	0.000	0.023	0.001	0.913 ✔	1.000	4.8.2 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	125 - 96.04	Pole	TP26.9x18x0.1875	1	-11.77	1026.09	51.3	Pass
L2	96.04 - 47.667	Pole	TP41.28x25.3212x0.25	2	-27.36	1984.91	97.5	Pass
L3	47.667 - 1	Pole	TP55x39.0504x0.3125	3	-43.12	3272.70	91.3	Pass
							Summary	
						Pole (L2)	97.5	Pass
						RATING =	**97.5**	**Pass**

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Subject:	Anchor Bolt and Baseplate Analysis
Location:	125-FT EEI Monopole Bethel, CT
Rev. 2: 5/18/18	Prepared by: T.J.L. Checked by: C.F.C. Job No. 18058.27

Anchor Bolt and Base Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	$M_u := 3315 \cdot ft \cdot kips$	(Input From tnxTower)
Shear Force =	$Shear := 37 \cdot kips$	(Input From tnxTower)
Axial Force =	$R_u := 43 \cdot kips$	(Input From tnxTower)

Anchor Bolt Data:

ASTMA615 Grade 75

Number of Anchor Bolts =	$N := 12$	(User Input)
Diameter of Bolt Circle =	$D_{BC} := 63 \cdot in$	(User Input)
Bolt Ultimate Strength =	$F_u := 100 \cdot ksi$	(User Input)
Bolt Yield Strength =	$F_y := 75 \cdot ksi$	(User Input)
Bolt Modulus =	$E := 29000 \cdot ksi$	(User Input)
Diameter of Anchor Bolts =	$D := 2.25 \cdot in$	(User Input)
Threads per Inch =	$n := 4.5$	(User Input)
Top of Concrete to Bot Leveling Nut =	$l_{ar} := 2 \cdot in$	(User Input)
Anchor Rod Force Correction Factor =	$n_c = 1.02$	Table 2-1 Addendum 3

Base Plate Data:

ASTMA572 Grade 60

Plate Yield Strength =	$F_{yf} := 60 \cdot ksi$	(User Input)
Base Plate Thickness =	$t_{TP} := 1.75 \cdot in$	(User Input)
Base Plate Diameter =	$D_{OD} := 69 \cdot in$	(User Input)
Outer Pole Diameter =	$D_T := 55 \cdot in$	(User Input)
Pole Wall Thickness =	$t_T := 0.3125 \cdot in$	(User Input)
Pole Design Yield Strength =	$F_{yp} := 65 \cdot ksi$	(User Input)
	$\eta := 0.5$	For Ungrouted Base Plate per TIA-222-G Section 4.9.9

Anchor Bolt Analysis:

Gross Area of Bolt = $A_g := \frac{\pi}{4}\cdot D^2 = 3.976\cdot in^2$

Net Area of Bolt = $A_n := \frac{\pi}{4}\cdot\left(D - \frac{0.9743\cdot in}{n}\right)^2 = 3.248\cdot in^2$

Tensile Root Diameter = $d_{rt} := D - \frac{0.9743\cdot in}{n} = 2.033\cdot in$

Plastic Section Modulus = $Z := \frac{d_{rt}^3}{6} = 1.401\cdot in^3$

Maximum Anchor Rod Force = $P_u := \frac{n_c\cdot\pi\cdot M_u}{N\cdot D_{BC}} + \frac{R_u}{N} = 172.2\cdot kips$

Maximum Shear Force = $V_u := \frac{Shear}{N} = 3.1\cdot kips$

Design Tensile Strength = $\Phi R_{nt} := 0.8\cdot F_u\cdot A_n = 259.815\cdot k$

Bolt % of Capacity = $\frac{\left(P_u + \frac{V_u}{\eta}\right)}{\Phi R_{nt}}\cdot 100 = 68.7$

Condition1 = $Condition1 := if\left[\frac{\left(P_u + \frac{V_u}{\eta}\right)}{\Phi R_{nt}} \le 1.00, "OK", "Overstressed"\right]$

Condition1 = "OK"

Design Shear Strength = $\Phi R_{nv} := 0.75\cdot 0.45\cdot F_u\cdot A_g = 134.193\cdot k$

Design Flexural Strength = $\Phi R_{nm} := 0.9\cdot F_y\cdot Z = 94.597\cdot in\cdot k$

$M_u := \begin{cases} 0 & \text{if } l_{ar} < D \\ 0.65\cdot l_{ar}\cdot V_u & \text{otherwise} \end{cases} = 0\cdot in\cdot k$

Bolt % of Capacity = $\left[\left(\frac{V_u}{\Phi R_{nv}}\right)^2 + \left(\frac{P_u}{\Phi R_{nt}} + \frac{M_u}{\Phi R_{nm}}\right)^2\right]\cdot 100 = 44$

Condition2 = $Condition2 := if\left[\left(\frac{V_u}{\Phi R_{nv}}\right)^2 + \left(\frac{P_u}{\Phi R_{nt}} + \frac{M_u}{\Phi R_{nm}}\right)^2 \le 1.00, "OK", "Overstressed"\right]$

Condition2 = "OK"

Base Plate Analysis:

Strength Resistance Factor for Yielding due to Bending = $\phi_b := 0.9$

Strength Resistance Factor for Yielding due to Shear = $\phi_v := 1.0$

Outside Fillet Horizontal Leg Dimension = $w_1 := 0.25 \cdot in$

Effective Pole Outside Diameter = $D_e := D_T + w_1 = 55.25 \cdot in$

Effective Base Plate Outside Diameter = $D_{oe} := \begin{cases} D_{OD} & \text{if } D_{OD} \le \left(D_{BC} + 6 \cdot t_{TP}\right) \\ \left(D_{BC} + 6 \cdot t_{TP}\right) & \text{otherwise} \end{cases} = 69 \cdot in$

Half-Angle Between Radial Lines Extending from Pole Centerline Through Midpoints Between Adjacent Anchor Rods = $\theta_1 := \frac{\pi}{N} = 0.262$

Angle Defining Limiting Effective Base Plate Width Based on Plate Thickness = $\theta_2 := \operatorname{asin}\left(\frac{12 \cdot t_{TP}}{D_{BC}}\right) = 0.34$

Angle Defining Limiting Effective Base Plate Width Based on Distance Between Anchor Rod Bolt Circle and Effective Pole Outside Diameter = $\theta_3 := \operatorname{acos}\left(\frac{D_{BC} + D_e}{2 \cdot D_{BC}}\right) = 0.353$

Governing Angle Defining Effective Base Plate Width Resisting Bending = $\theta := \min\left(\theta_1, \theta_2, \theta_3\right) = 0.262$

Effective Moment Arm of Anchor Rod Force = $x := 0.5 \cdot \left(D_{BC} - D_e\right) = 3.875 \cdot in$

Effective Base Plate Width Resisting Bending from Transverse Bend Line = $B_{et} := D_{BC} \cdot \sin(\theta) = 16.306 \cdot in$

Effective Base Plate Width Resisting Bending from Radial Bend Lines = $B_{er} := \left(D_{oe} - D_e\right) \cdot \sin(\theta) = 3.559 \cdot in$

Total Effective Base Plate Width Resisting Bending = $B_{eff} := B_{et} + B_{er} = 19.864 \cdot in$

Required Base Plate Thickness = $t_{TP.Req} := \sqrt{\frac{4 \cdot P_u \cdot x}{\phi_b \cdot F_{yf} \cdot B_{eff}}} = 1.577 \cdot in$

Plate Bending Stress % of Capacity = $\frac{t_{TP.Req}}{t_{TP}} = 90.1 \cdot \%$

Condition2 = $Condition3 := if\left(\frac{t_{TP.Req}}{t_{TP}} < 1.00, "Ok", "Overstressed"\right)$

Condition3 = "Ok"

Required Base Plate Thickness = $t_{TP.Req} := \frac{\phi_b \cdot t_T \cdot F_{yp}}{\phi_v \cdot 0.6 \cdot F_{yf}} = 0.508 \cdot in$

Plate Bending Stress % of Capacity = $\frac{t_{TP.Req}}{t_{TP}} = 29.0 \cdot \%$

Condition2 = $Condition4 := if\left(\frac{t_{TP.Req}}{t_{TP}} < 1.00, "Ok", "Overstressed"\right)$

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Subject:	FOUNDATION ANALYSIS
Location:	125-ft EEI Monopole Bethel, CT
Rev. 2: 5/18/18	Prepared by: T.J.L Checked by: C.A.G. Job no. 18058.27

Standard Monopole Foundation:

Input Data:

Tower Data

Overturning Moment =	$OM := 3315 \cdot ft \cdot kips$	(User Input)	
Shear Force =	$Shear := 37 \cdot kip$	(User Input)	
Axial Force =	$Axial := 43 \cdot kip$	(User Input)	
Tower Height =	$H_t := 125 \cdot ft$	(User Input)	

Footing Data:

Overall Depth of Footing =	$D_f := 4.5 \cdot ft$	(User Input)	
Length of Pier =	$L_p := 1 \cdot ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 1 \cdot ft$	(User Input)	
Diameter of Pier =	$d_p := 7.0 \cdot ft$	(User Input)	
Thickness of Footing =	$T_f := 4.5 \cdot ft$	(User Input)	
Width of Footing =	$W_f := 25 \cdot ft$	(User Input)	

Anchor Bolt Data:

Length of Anchor Bolts=	$L_{st} := 72 \cdot in$	(User Input)	
Projection of Anchor Bolts Above Pier =	$A_{BP} := 12.0 \cdot in$	(User Input)	
Anchor Bolt Diameter =	$d_{anchor} := 2.25 \cdot in$	(User Input)	
Base Plate Bolt Circle =	$MP := 63 \cdot in$	(User Input)	

Material Properties:

Concrete Compressive Strength =	$f_c := 4000 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Anchor Bolt Yield Strength =	$f_{ya} := 75000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 30 \cdot deg$	(User Input)	
Ultimate Soil Bearing Capacity =	$q_u := 6000 \cdot psf$	(User Input)	
Allowable Soil Bearing Capacity =	$q_a := \frac{q_u}{2} = 3000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 100 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Pier Reinforcement:

Bar Size =	$BS_{pier} := 9$	(User Input)	
Bar Diameter =	$d_{bpier} := 1.128 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 24$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{Tie} := 3 \cdot in$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 9$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 1.128 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 28$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 9$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 1.128 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 28$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area = $A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 0.999 \cdot in^2$

Pad Top Reinforcement Bar Area = $A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 0.999 \cdot in^2$

Pad Bottom Reinforcement Bar Area = $A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 0.999 \cdot in^2$

Coefficient of Lateral Soil Pressure = $K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3$

Stability of Footing:

Adjusted Concrete Unit Weight =

$$\gamma_c := \text{if}\left(\text{Bouyancy} = 1, \gamma_{conc} - 62.4pcf, \gamma_{conc}\right) = 150 \cdot pcf$$

Adjusted Soil Unit Weight =

$$\gamma_s := \text{if}\left(\text{Bouyancy} = 1, \gamma_{soil} - 62.4pcf, \gamma_{soil}\right) = 100 \cdot pcf$$

Passive Pressure =

$$P_{pn} := K_p \cdot \gamma_s \cdot n + c \cdot 2 \cdot \sqrt{K_p} = 0 \cdot ksf$$

$$P_{pt} := K_p \cdot \gamma_s \cdot \left(D_f - T_f\right) + c \cdot 2 \cdot \sqrt{K_p} = 0 \cdot ksf$$

$$P_{top} := \text{if}\left[n < \left(D_f - T_f\right), P_{pt}, P_{pn}\right] = 0 \cdot ksf$$

$$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 1.35 \cdot ksf$$

$$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 0.675 \cdot ksf$$

$$T_p := \text{if}\left[n < \left(D_f - T_f\right), T_f, \left(D_f - n\right)\right] = 4.5$$

$$A_p := W_f \cdot T_p = 112.5$$

Ultimate Shear =

$$S_u := P_{ave} \cdot A_p = 75.938 \cdot kip$$

Weight of Concrete Pad =

$$WT_c := \left[\left(W_f^2 \cdot T_f\right) + d_p^2 L_p\right] \cdot \gamma_c = 429.225 \cdot kip$$

Weight of Soil Above Footing =

$$WT_{s1} := \left[\left(W_f^2 - d_p^2\right) \cdot \left(\left|L_p - L_{pag} - n\right|\right)\right] \cdot \gamma_s = 0 \cdot kip$$

Weight of Soil Wedge at Back Face =

$$WT_{s2} := \left(\frac{D_f^2 \cdot \tan\left(\Phi_s\right)}{2} \cdot W_f\right) \cdot \gamma_s = 14.614 \cdot kip$$

Weight of Soil Wedge at back face Corners =

$$WT_{s3} := 2 \cdot \left[\left(D_f\right)^3 \cdot \frac{\tan\left(\Phi_s\right)}{3}\right] \cdot \gamma_s = 3.507 \cdot kips$$

Total Weight =

$$WT_{tot} := WT_c + WT_{s1} + Axial = 472.225 \cdot kip$$

Resisting Weight =

$$WT_R := 0.9 \cdot WT_c + 0.75 \cdot WT_{s1} + 0.75 \cdot Axial = 418.553 \cdot kip$$

Resisting Moment =

$$M_r := \left(WT_R\right) \cdot \frac{W_f}{2} + 0.75 \cdot S_u \cdot \frac{T_f}{3} + 0.75 \cdot \left[\left(WT_{s2} + WT_{s3}\right) \cdot \left(W_f + \frac{D_f \cdot \tan\left(\Phi_s\right)}{3}\right)\right] = 5669 \cdot kip \cdot ft$$

Overturning Moment =

$$M_{ot} := OM + Shear \cdot \left(L_p + T_f\right) = 3519 \cdot kip \cdot ft$$

Factor of Safety Actual =

$$FS := \frac{M_r}{M_{ot}} = 1.61$$

Factor of Safety Required =

$$FS_{req} := 1$$

$$OverTurning\_Moment\_Check := \text{if}\left(FS \geq FS_{req}, \text{"Okay"}, \text{"No Good"}\right)$$

OverTurning_Moment_Check = "Okay"

Shear Capacity in Pier:

Shear Resistance of Pier = $S_p := \frac{P_{ave} \cdot A_p + \mu \cdot WT_{tot}}{FS_{req}} = 288.439 \cdot kips$

$Shear\_Check := if(S_p > Shear, "Okay", "No Good")$

Shear_Check = "Okay"

Bearing Pressure Caused by Footing:

Area of the Mat = $A_{mat} := W_f^2 = 625$

Section Modulus of Mat = $S := \frac{W_f^3}{6} = 2604.17 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{WT_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 2.107 \cdot ksf$

$Max\_Pressure\_Check := if(P_{max} < .75 \cdot q_u, "Okay", "No Good")$

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat = $P_{min} := \frac{WT_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = -0.596 \cdot ksf$

$Min\_Pressure\_Check := if[(P_{min} \geq 0) \cdot (P_{min} < .75 \cdot q_u), "Okay", "No Good"]$

Min_Pressure_Check = "No Good"

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 6.497$

Distance to Kern = $X_k := \frac{W_f}{6} = 4.167$

Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Eccentricity = $e := \frac{M_{ot}}{WT_{tot}} = 7.451$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot WT_{tot}}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)} = 2.494 \cdot ksf$

$q_{adj} := if(P_{min} < 0, P_a, P_{max}) = 2.494 \cdot ksf$

$Pressure\_Check := if(q_{adj} < .75 \cdot q_u, "Okay", "No Good")$

Pressure_Check = "Okay"

Concrete Bearing Capacity:

Strength Reduction Factor = $\Phi_c := 0.65$ (ACI-2008 9.3.2.2)

Bearing Strength Between Pier and Pad = $P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^2}{4} = 1.225 \times 10^4 \cdot kips$ (ACI-2008 10.14)

$Bearing\_Check := if(P_b > Axial, "Okay", "No Good")$

Bearing_Check = "Okay"

Shear Strength of Concrete:

Beam Shear: (Critical section located at a distance d from the face of Pier) (ACI 11.3.1.1)

$\phi_c := 0.85$ (ACI 9.3.2.5)

$d := T_f - Cvr_{pad} - d_{bbot} = 4.156$

$d_1 := \frac{W_f}{2} - \frac{d_p}{2}$

$d_2 := d_1 - d$

$L := \left(\frac{W_f}{2} - e\right) \cdot 3$

$Slope := if\left(L > W_f, \frac{P_{max} - P_{min}}{W_f}, \frac{q_{adj}}{L}\right)$

$V_{req} := \left[\left(q_{adj} - Slope \cdot d_1\right) + \left(\frac{Slope \cdot d_1}{2}\right)\right] \cdot W_f \cdot d_1$

$V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot psi} \cdot W_f \cdot d$ (ACI-2008 11.2.1.1)

$Beam\_Shear\_Check := if(V_{req} < V_{Avail}, "Okay", "No Good")$

Beam_Shear_Check = "Okay"

Punching Shear: (Critical Section Located at a distance of d/2 from the face of pier) (ACI 11.11.1.2)

Critical Perimeter of Punching Shear = $b_o := (d_p + d) \cdot \pi = 35$

Area Included Inside Perimeter = $A_{bo} := \frac{\pi \cdot (d_p + d)^2}{4} = 97.7$

Area Outside of Perimeter = $A_{out} := A_{mat} - A_{bo} = 527.3$

Guess Value = $v_u := 1ksf$

(From "Foundation Analysis and design", By Joseph Bowles, Eq. 8-9)

Given $d^2 + d_p \cdot d = \frac{WT_{tot}}{\pi \cdot v_u}$

$v_u := Find(v_u) = 3.2 \cdot ksf$

$V_u := v_u \cdot d \cdot W_f = 336.8 \cdot kips$

Required Shear Strength = $V_{req} := V_u = 336.8 \cdot kips$

Available Shear Strength = $V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 4510.3 \cdot kip$ (ACI-2008 11.11.2.1)

$Punching\_Shear\_Check := if(V_{req} < V_{Avail}, "Okay", "No Good")$

Punching_Shear_Check = "Okay"

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

Strength Reduction Factor = $\phi_m := .90$ (ACI-2008 9.3.2.1)

$q_b := q_{adj} - d_1 \cdot Slope = 1.012 \cdot ksf$

Maximum Bending at Face of Pier = $M_n := \frac{1}{\phi_m} \cdot \left[(q_{adj} - q_b) \cdot \frac{d_1^2}{3} + q_b \cdot \frac{d_1^2}{2} \right] \cdot W_f = 2250.1 \cdot kip \cdot ft$

$\beta := \begin{cases} 0.85 & \text{if } 2500 \cdot psi \le f_c \le 4000 \cdot psi \\ 0.65 & \text{if } f_c > 8000 \cdot psi \\ \left[0.85 - \left[\frac{\left(\frac{f_c}{psi} - 4000 \right)}{1000} \right] \cdot 0.5 \right] & \text{otherwise} \end{cases} = 0.85$ (ACI-200810.2.7.3)

$R_n := \frac{M_n}{W_f \cdot d^2} = 36.2 \cdot psi$

$\rho := \frac{0.85 \cdot f_c}{f_y} \left(1 - \sqrt{1 - \frac{2 \cdot R_n}{0.85 \cdot f_c}} \right) = 0.0006$

$\rho_{min} := \rho = 0.00061$

Required Reinforcement for Temperature and Shrinkage:

$$\rho_{sh} := \begin{cases} .0018 & \text{if } f_y \geq 60000 \cdot psi \\ .0020 & \text{otherwise} \end{cases}$$ (ACI-2008 7.12.2.1)

Check Bottom Bars:

$$As := \begin{cases} \rho_{min} \cdot W_f \cdot d & \text{if } \rho_{min} > \frac{\rho_{sh}}{2} \\ \rho_{sh} \cdot W_f \cdot \frac{d}{2} & \text{otherwise} \end{cases} = 13.465 \cdot in^2$$

$As_{prov} := A_{bbot} \cdot NB_{bot} = 28 \cdot in^2$

$Pad\_Reinforcement\_Bot := if(As_{prov} > As, "Okay", "No Good")$

Pad_Reinforcement_Bot = "Okay"

Check top Bars:

$As := \rho_{sh} \cdot \left(W_f \cdot \frac{d}{2}\right) = 13.5 \cdot in^2$

$As_{prov} := A_{btop} \cdot NB_{top} = 28 \cdot in^2$

$Pad\_Reinforcement\_Top := if(As_{prov} > As, "Okay", "No Good")$

Pad_Reinforcement_Top = "Okay"

Developement Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 9.72 \cdot in$$

Spacing or Cover Dimension =

$$c := if\left(Cvr_{pad} < \frac{B_{sPad}}{2}, Cvr_{pad}, \frac{B_{sPad}}{2}\right) = 3 \cdot in$$

Transverse Reinforcement Index =

$k_{tr} := 0$ (ACI-2008 12.2.3)

$$L_{dbt} := \frac{3 \cdot f_y \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot} = 30.2 \cdot in$$

Minimum Development Length =

$L_{dbmin} := 12 \cdot in$ (ACI-2008 12.2.1)

$L_{dbtCheck} := if(L_{dbt} \geq L_{dbmin}, "Use L.dbt", "Use L.dbmin")$

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{d_p}{2} - Cvr_{pad} = 105 \cdot in$$

$Lpad\_Check := if(L_{Pad} > L_{dbt}, "Okay", "No Good")$

Lpad_Check = "Okay"

Steel Reinforcement in Pier:

Area of Pier = $A_p := d_p^2 = 7056 \cdot in^2$

$A_{smin} := 0.0033 \cdot A_p = 23.28 \cdot in^2$

$A_{sprov} := NB_{pier} \cdot A_{bpier} = 23.98 \cdot in^2$

$Steel\_Area\_Check := if(A_{sprov} > A_{smin}, "Okay", "No Good")$

$Steel\_Area\_Check = "Okay"$

Bar Spacing In Pier = $B_{sPier} := \frac{d_p \cdot \pi}{NB_{pier}} - d_{bpier} = 9.868 \cdot in$

Diameter of Reinforcement Cage = $Diam_{cage} := d_p - 2 \cdot Cvr_{pier} = 78 \cdot in$

Maximum Moment in Pier = $M_p := \left[OM + Shear \cdot \left(L_p + \frac{A_{BP}}{2} \right) \right] = 40446 \cdot in \cdot kips$

Pier Check evaluated from outside program and results are listed below;

$(D \ N \ n \ P_u \ M_{xu}) := \left(d_p \cdot 12 \ \ NB_{pier} \ \ BS_{pier} \ \ \frac{Axial \cdot 1.333}{kips} \ \ \frac{M_p}{in \cdot kips} \right)$

$(D \ N \ n \ P_u \ M_{xu}) = (84 \ \ 24 \ \ 9 \ \ 57.3 \ \ 40446)$

$(\phi P_n \ \ \phi M_{xn} \ \ f_{sp} \ \ \rho) := (0 \ \ 0 \ \ 0 \ \ 0)$

$(\phi P_n \ \ \phi M_{xn} \ \ f_{sp} \ \ \rho) := \phi P'_n(D, N, n, P_u, M_{xu})^T$

$(\phi P_n \ \ \phi M_{xn} \ \ f_{sp} \ \ \rho) = (68.6 \ \ 48440.9 \ \ -60 \ \ 0)$

$Axial\_Load\_Check := if(\phi P_n \geq P_u, "Okay", "No Good")$

$Axial\_Load\_Check = "Okay"$

$Bending\_Check := if(\phi M_{xn} \geq M_{xu}, "Okay", "No Good")$

$Bending\_Check = "Okay"$

Development Length Pier Reinforcement:

Available Length in Foundation:

$L_{pier} := L_p - Cvr_{pier} = 9 \cdot in$

$L_{pad} := T_f - Cvr_{pad} = 51 \cdot in$

Tension: (ACI-2008 12.2.3)

Spacing or Cover Dimension =

$c := if\left(Cvr_{pier} < \frac{B_{sPier}}{2}, Cvr_{pier}, \frac{B_{sPier}}{2}\right) = 3 \cdot in$

Transverse Reinforcement = $k_{tr} := 0$ (ACI-2008 12.2.3)

$L_{dbt} := \frac{3 \cdot f_y \cdot \alpha_{pier} \cdot \beta_{pier} \cdot \gamma_{pier} \cdot \lambda_{pier}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \left(\frac{c + k_{tr}}{d_{bpier}}\right)} \cdot d_{bpier} = 30.18 \cdot in$

Minimum Development Length = $L_{dh} := \frac{1200 \cdot d_{bpier}}{\sqrt{\frac{f_c}{psi}}} \cdot .7 = 14.982 \cdot in$ (ACI 12.2.1)

Pier reinforcement bars are standard 90 degree hooks and therefore developement in the pad is computed as follows:

$L_{db} := \max\left(L_{dbt}, L_{dbmin}\right)$

$L_{tension\_Check} := if\left(L_{pier} + L_{pad} > L_{dbt}, "Okay", "No Good"\right)$

$L_{tension\_Check} = "Okay"$

Compression: (ACI-2008 12.3.2)

$L_{dbc1} := \frac{.02 \cdot d_{bpier} \cdot f_y}{\sqrt{f_c \cdot psi}} = 21.402 \cdot in$

$L_{dbmin} := 0.0003 \cdot \frac{in^2}{lb} \cdot \left(d_{bpier} \cdot f_y\right) = 20.304 \cdot in$

$L_{dbc} := if\left(L_{dbc1} \geq L_{dbmin}, L_{dbc1}, L_{dbmin}\right) = 21.402 \cdot in$

$L_{compression\_Check} := if\left(L_{pier} + L_{pad} > L_{dbc}, "Okay", "No Good"\right)$

$L_{compression\_Check} = "Okay"$

RAN Template:	A&L Template:	Power System Template:
67D92DB Outdoor	6792DB_2xAIR+1QP	Custom

CT11115F_L600_3.1_draft

Section 1 - Site Information

Site ID: CT11115F
Status: Draft
Version: 3.1
Project Type: L600
Approved: Not Approved
Approved By: Not Approved
Last Modified: 4/30/2018 5:2:47 PM
Last Modified By: GSM1900\AMurill9

Site Name: CT115/SNET Valley_FT
Site Class: Monopole
Site Type: Structure Non Building
Solution Type:
Plan Year:
Market: CONNECTICUT
Vendor: Ericsson
Landlord: SNET

Latitude: 41.36222100
Longitude: -73.39666800
Address: 38 Spring Hill Lane
City, State: Bethel, CT
Region: NORTHEAST

RAN Template: 67D92DB Outdoor			AL Template: 6792DB_2xAIR+1QP	
Sector Count: 3	Antenna Count: 9	Coax Line Count: 6	TMA Count: 3	RRU Count: 3

Section 2 - Existing Template Images

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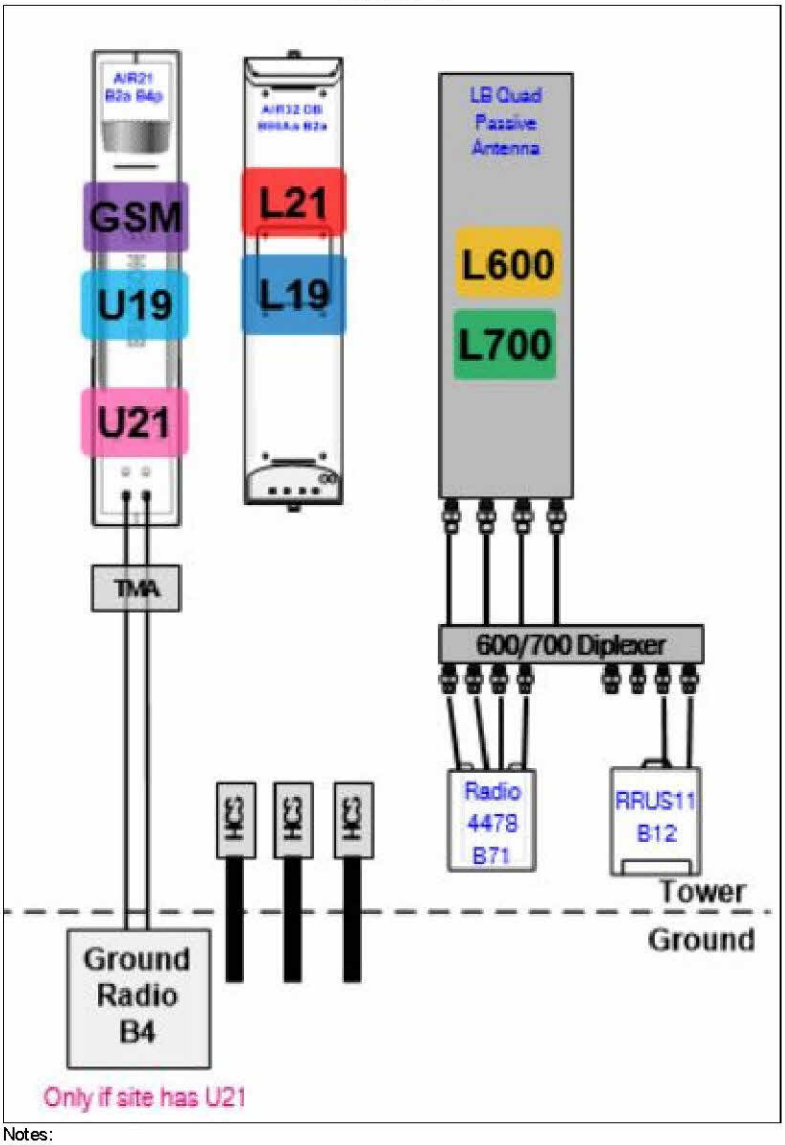
Section 3 - Proposed Template Images

6792DB.JPG



Notes:

Section 4 - Siteplan Images

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RAN Template:	A&L Template:	Power System Template:
67D92DB Outdoor	6792DB_2xAIR+1QP	Custom

CT11115F_L600_3.1_draft

Section 5 - RAN Equipment

Existing RAN Equipment		
Template: 792DB Outdoor		
Enclosure	1	2
Enclosure Type	RBS 3106	S12000 Outdoor
Baseband	DUS41 (L2100, L1900); DUW30 (U2100); DUW30 (U1900 (DECOMMISSIONED)); DUG20 (G1900)	
Multiplexer	XMU (L2100, L1900, L700)	
Radio	RU22 (x6) (U2100)	

Proposed RAN Equipment		
Template: 67D92DB Outdoor		
Enclosure	1	2
Enclosure Type	RBS 6131	Ancillary Equipment
Baseband	DUW30 (U1900 (DECOMMISSIONED)); DUW30 (U2100); DUG20 (G1900); BB 5216 (L2100, L1900, L700, L600)	
Hybrid Cable System		Ericsson 6x12 HCS 6AWG 50m (x2); Ericsson 9x18 HCS 50m
Multiplexer	XMU	
Radio	RU22 (x6) (U2100)	

RAN Scope of Work:

RAN Template:	A&L Template:	Power System Template:
67D92DB Outdoor	6792DB_2xAIR+1QP	Custom

CT11115F_L600_3.1_draft

Section 6 - A&L Equipment

Existing Template: 702Cu
Proposed Template: 6792DB_2xAIR+1QP

Sector 1 (Existing) view from behind

Coverage Type	A - Outdoor Macro					
Antenna	1		2	3	4	
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		Andrew - LNX-6515DS-A1M (Dual)	Empty Antenna Mount (Empty mount)	Ericsson - AIR21 KRC118023-1_B2P_B4A (Quad)	
Azimuth	60		60		60	
M. Tilt	0		0		0	
Height	102		102		102	
Ports	P2	P1	P3		P5	P4
Active Tech.	U2100	L1900 G1900	L700			L2100
Dark Tech.						
Restricted Tech.						
Decomm. Tech.		U1900				
E. Tilt	3	3	2			3
Cables	1-5/8" Coax - 175 ft. (x2) 1-5/8" LMU Coax - 175 ft. Fiber Jumper - 15 ft.	1-5/8" LMU Coax - 175 ft. (x2) Fiber Jumper - 15 ft. (x2)	Fiber Jumper - 15 ft.		Fiber Jumper - 15 ft. (x2)	Fiber Jumper - 15 ft. (x2)
TMAs	Generic Twin Style 1B - AWS (AtAntenna)	Generic Twin Style 1B - AWS (AtAntenna)				
Diplexers / Combiners						
Radio			RRUS11 B12 (At Antenna)			
Sector Equipment						

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:	Power System Template:
67D92DB Outdoor	6792DB_2xAIR+1QP	Custom

CT11115F_L600_3.1_draft

Sector 1 (Proposed) view from behind											
Coverage Type	A - Outdoor Macro										
Antenna	1		2				3	4			
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		RFS - APXVAARR24_43-U-NA20 (Octo)				Empty Antenna Mount (Empty mount)	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	60		60					60			
M. Tilt	0		0					0			
Height	102		102					102			
Ports	P1	P2	P3	P4	P5	P6		P7	P8	P9	P10
Active Tech.	G1900	U2100			L700 L600	L700 L600		L2100	L2100	L1900	L1900
Dark Tech.											
Restricted Tech.											
Decomm. Tech.	U1900										
E. Tilt											
Cables		1 5/8In AVA COAX CABLE FIRE RETARDENT - 175 ft. (x2) JUMPER 6' DIN MALE-DIN MALE (x2)			JUMPER 6' DIN MALE-DIN MALE (x2)	JUMPER 6' DIN MALE-DIN MALE (x2)		Fiber Jumper		Fiber Jumper	
TMAs		Generic Twin Style 1B - AWS (AtAntenna)									
Diplexers / Combiners											
Radio					Radio 4449 B71+B12 (AtAntenna)						
Sector Equipment											

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:	Power System Template:
67D92DB Outdoor	6792DB_2xAIR+1QP	Custom

CT11115F_L600_3.1_draft

Sector 2 (Existing) view from behind						
Coverage Type	A - Outdoor Macro					
Antenna	1		2	3	4	
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		Andrew - LNX-6515DS-A1M (Dual)	Empty Antenna Mount (Empty mount)	Ericsson - AIR21 KRC118023-1_B2P_B4A (Quad)	
Azimuth	180		180		180	
M. Tilt	0		0		0	
Height	102		102		102	
Ports	P1	P2	P3		P4	P5
Active Tech.	L1900 G1900	U2100	L700		L2100	
Dark Tech.						
Restricted Tech.						
Decomm. Tech.	U1900					
E. Tilt	3	3	2		3	
Cables	Fiber Jumper - 15 ft. (x2) 1-5/8" LMU Coax - 175 ft. (x2)	1-5/8" Coax - 175 ft. (x2)	Fiber Jumper - 15 ft.		Fiber Jumper - 15 ft. (x2)	
TMAs		Generic Twin Style 1B - AWS (AtAntenna)				
Diplexers / Combiners						
Radio			RRUS11 B12 (At Antenna)			
Sector Equipment						

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:	Power System Template:
67D92DB Outdoor	6792DB_2xAIR+1QP	Custom

CT11115F_L600_3.1_draft

Sector 2 (Proposed) view from behind											
Coverage Type	A - Outdoor Macro										
Antenna	1		2				3	4			
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		RFS - APXVAARR24_43-U-NA20 (Octo)				Empty Antenna Mount (Empty mount)	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	180		180				180	180			
M. Tilt	0		0					0			
Height	102		102					102			
Ports	P1	P2	P3	P4	P5	P6		P7	P8	P9	P10
Active Tech.	G1900	U2100			L700 L600	L700 L600		L2100	L2100	L1900	L1900
Dark Tech.											
Restricted Tech.											
Decomm. Tech.	U1900										
E. Tilt											
Cables		1 5/8In AVA COAX CABLE FIRE RETARDENT - 175 ft. (x2) JUMPER 6' DIN MALE-DIN MALE (x2)			JUMPER 6' DIN MALE-DIN MALE (x2)	JUMPER 6' DIN MALE-DIN MALE (x2)		Fiber Jumper		Fiber Jumper	
TMAs		Generic Twin Style 1B - AWS (AtAntenna)									
Diplexers / Combiners											
Radio					Radio 4449 B71+B12 (AtAntenna)						
Sector Equipment											

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:	Power System Template:
67D92DB Outdoor	6792DB_2xAIR+1QP	Custom

CT11115F_L600_3.1_draft

Sector 3 (Existing) view from behind						
Coverage Type	A - Outdoor Macro					
Antenna	1		2	3	4	
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		Andrew - LNX-6515DS-A1M (Dual)	Empty Antenna Mount (Empty mount)	Ericsson - AIR21 KRC118023-1_B2P_B4A (Quad)	
Azimuth	300		300		300	
M. Tilt	0		0		0	
Height	102		102		102	
Ports	P2	P1	P3		P4	P5
Active Tech.	U2100	L1900 G1900	L700		L2100	
Dark Tech.						
Restricted Tech.						
Decomm. Tech.		U1900				
E. Tilt	8	8	2		8	
Cables	1-5/8" Coax - 175 ft. (x2) 1-5/8" LMU Cox - 175 ft. Fiber Jumper - 15 ft.	1-5/8" LMU Cox - 175 ft. (x2) Fiber Jumper - 15 ft. (x2)	Fiber Jumper - 15 ft.		Fiber Jumper - 15 ft. (x2)	
TMAs	Generic Twin Style 1B - AWS (AtAntenna)	Generic Twin Style 1B - AWS (AtAntenna)				
Diplexers / Combiners						
Radio			RRUS11 B12 (At Antenna)			
Sector Equipment						

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:	Power System Template:
67D92DB Outdoor	6792DB_2xAIR+1QP	Custom

CT11115F_L600_3.1_draft

Sector 3 (Proposed) view from behind											
Coverage Type	A - Outdoor Macro										
Antenna	1		2				3	4			
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		RFS - APXVAARR24_43-U-NA20 (Octo)				Empty Antenna Mount (Empty mount)	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	300		300					300			
M. Tilt	0		0					0			
Height	102		102					102			
Ports	P1	P2	P3	P4	P5	P6		P7	P8	P9	P10
Active Tech.	G1900	U2100			L700 L600	L700 L600		L2100	L2100	L1900	L1900
Dark Tech.											
Restricted Tech.											
Decomm. Tech.	U1900										
E. Tilt											
Cables		1 5/8In AVA COAX CABLE FIRE RETARDENT - 175 ft. (x2) JUMPER 6' DIN MALE-DIN MALE (x2)			JUMPER 6' DIN MALE-DIN MALE (x2)	JUMPER 6' DIN MALE-DIN MALE (x2)		Fiber Jumper		Fiber Jumper	
TMAs		Generic Twin Style 1B - AWS (AtAntenna)									
Diplexers / Combiners											
Radio					Radio 4449 B71+B12 (AtAntenna)						
Sector Equipment											

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:	Power System Template:
67D92DB Outdoor	6792DB_2xAIR+1QP	Custom

CT11115F_L600_3.1_draft

Section 7 - Power Systems Equipment

Existing Power Systems Equipment
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Proposed Power Systems Equipment

RADIO FREQUENCY SYSTEMS
The Clear Choice®

Dual Slant Polarized Quad Band (8 Port) Antenna, 617-746/617-746/1695-2200/1695-2200MHz, 65deg, 15/15/18/18dBi, 2.4m (8ft), VET, RET, 0-12°/0-12°/2-12°/2-12°

FEATURES / BENEFITS

This antenna provides a 8 Port multi-band flexible platform for advanced use for flexible use in deployment scenarios for encompassing 600MHz, 700MHz, AWS & PCS applications.

- **24 Inch Width For Easier Zoning**
- **Field Replaceable (Integrated) AISG RET platform for reduced environmental exposure and long lasting quality**
- **Superior elevation pattern performance across the entire electrical down tilt range**
- **Includes three AISG RET motors - Includes 0.5m AISG jumper for optional diasy chain of two high band RET motors for one single AISG point of high band tilt control.**
- **Low band arrays driven by a single RET motor**

Technical Features

LOW BAND LEFT ARRAY (617-746 MHZ) [R1]

Frequency Band	MHz	617-698	698-746
Gain	dBi	15.1	15.5
Horizontal Beamwidth @3dB	Deg	65	62
Vertical Beamwidth @3dB	Deg	11.4	10.4
Electrical Downtilt Range	Deg	0-12	0-12
Upper Side Lobe Suppression 0 to +20	dB	19	20
Front-to-Back, at +/-30°, Copolar	dB	25	24
Cross Polar Discrimination (XPD) @ Boresight	dB	19	19
Cross Polar Discrimination (XPD) @ +/-60	dB	5	3
3rd Order PIM 2 x 43dBm	dBc		-153
VSWR	-	1.5:1	1.5:1
Cross Polar Isolation	dB	25	25
Maximum Effective Power per Port	Watt	250	250

LOW BAND RIGHT ARRAY (617-746 MHZ) [R2]

Frequency Band	MHz	617-698	698-746
Gain	dBi	14.8	15.1
Horizontal Beamwidth @3dB	Deg	65	62
Vertical Beamwidth @3dB	Deg	11.4	10.3
Electrical Downtilt Range	Deg	0-12	0-12
Upper Side Lobe Suppression 0 to +20	dB	19	20
Front-to-Back, at +/-30°, Copolar	dB	25	23
Cross Polar Discrimination (XPD) @ Boresight	dB	19	19
Cross Polar Discrimination (XPD) @ +/-60	dB	5	3
3rd Order PIM 2 x 43dBm	dBc		-153
VSWR	-	1.5:1	1.5:1
Cross Polar Isolation	dB	25	25
Maximum Effective Power per Port	Watt	250	250

RADIO FREQUENCY SYSTEMS
The Clear Choice®

Dual Slant Polarized Quad Band (8 Port) Antenna, 617-746/617-746/1695-2200/1695-2200MHz, 65deg, 15/15/18/18dBi, 2.4m (8ft), VET, RET, 0-12°/0-12°/2-12°/2-12°

ELECTRICAL SPECIFICATIONS

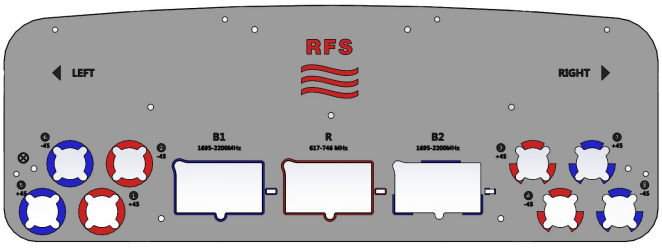
Impedance	Ohm	50.0
Polarization	Deg	±45°

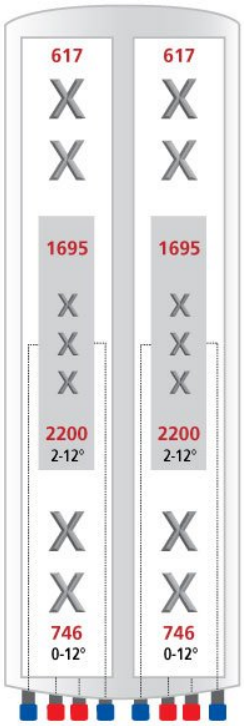
MECHANICAL SPECIFICATIONS

Dimensions - H x W x D	mm (in)	2436 x 609 x 222 (95.9 x 24 x 8.7)
Weight (Antenna Only)	kg (lb)	58 (128)
Weight (Mounting Hardware only)	kg (lb)	11.5 (25.3)
Shipping Weight	kg (lb)	80 (176)
Connector type		8 x 4.3-10 female at bottom + 6 AISG connectors (3 male, 3 female)
Adjustment mechanism		Integrated RET solution AISG compliant (Field Replaceable) + Manual Override + External Tilt Indicator
Mounting Hardware Material		Galvanized steel
Radome Material / Color		Fiber Glass / Light Grey RAL7035

TESTING AND ENVIRONMENTAL

Temperature Range	°C (°F)	-40 to 60 (-40 to 140)
Lightning protection		IEC 61000-4-5
Survival/Rated Wind Velocity	km/h	241 (150)
Environmental		ETSI 300-019-2-4 Class 4.1E





ORDERING INFORMATION

Order No.	Configuration	Mounting Hardware	Mounting pipe Diameter	Shipping Weight
APXVAARR24_43-U-NA20	Field Replace RET included (3)	APM40-5E Beam tilt kit (included)	60-120mm	80 Kg

AIR-32 B4A/B2P & B2A/B66AA

ERICSSON ANTENNA INTEGRATED RADIO AIR-32

Radio		
	Single Band (B4a/B2p)	**Dual Band (B2a/B66Aa)**
Band 2 (1850-1910 / 1930-1990 MHz)	Passive frequency band	Active frequency band
Band 4 (1710-1755 / 2110-2155 MHz)	Active frequency band	Subset of Band 66A (AWS 1+3)
Band 66A (1710-1780 / 2110-2180 MHz)	N/A	Active frequency band
PA Output Power	4 x 30W	2 x (4 x 30) W
Downlink EIRP in bore-sight direction for each active band	4 x 62.5 dBmi	4 x 62.5 dBmi
Instantaneous bandwidth	45 MHz (W, L)	B2: 40 MHz (W, L) B2: 20 MHz (G) B66A: 70 MHz (W, L)
Capacity (single standard per unit)	6 GSM 6 WCDMA 2 x 20 MHz LTE	6 GSM (B2 only) 6 WCDMA per Active frequency band 2 x 20 MHz LTE per band
Multi-RAT capability	WCDMA and LTE on both PAs	WCDMA and GSM on both PAs (B2 only) WCDMA and LTE on both PAs (B2 and B4) GSM and LTE (B2 only)

Interfaces		
Optical CPRI	2 x 10 Gbps	2 x 10 Gbps per Active frequency band
DC Power	-48 VDC 3-wire or 2-wire	-48 VDC 3-wire or 2-wire (separate input for both radios)
AC power (Optional)	PSU-AC 08	PSU-AC 08
Passive antenna	4 RF connectors (7/16 female)	N/A
Environmental		
Operating Temperature Range	-40 to +55 °C	-40 to +55 °C
Solar Radiation	≤ 1,120 W/m²	≤ 1,120 W/m²
Relative Humidity	5 to 100%	5 to 100%
Absolute Humidity	0.26 to 40 g/m^3	0.26 to 40 g/m^3
Maximum temperature change	1.0°C/min	1.0°C/min
Antenna		
Electrical Tilt	2º – 12º (B4) 2º – 12º (B2)	2º – 12º (B66A) 2º – 12º (B2)
Bore-sight antenna gain	18 dBi (B4) 17.5 dBi (B2)	18 dBi (B66A) 17.5 dBi (B2)
Nominal beam-width, azimuth	65º (B4) 63º (B2)	65º (B66A) 63º (B2)
Nominal beam-width, elevation	6º (B4) 6º (B2)	6º (B66A) 6º (B2)
Mechanical		
Weight	48 Kg (105.8 lbs)	60 Kg (132.2 lbs)
Dimensions (H x W x D)	1439 x 327 x 220 mm (56.6” x 12.9” x 8.7”)	1439 x 327 x 220 mm (56.6” x 12.9” x 8.7”)
Wind load at 42 m/s (150 km/h) Front / Lateral / Rear	640N / 300N / 660N	640N / 300N / 660N

T-Mobile

WIRELESS COMMUNICATIONS FACILITY

CT115/SNET VALLEY_FT

SITE ID: CT11115F

38 SPRING HILL LANE

BETHEL, CT 06801

T-MOBILE RF CONFIGURATION

6792DB_2xAIR+1QP

PROJECT SUMMARY

1. THE PROPOSED SCOPE OF WORK CONSISTS OF A MODIFICATION TO THE EXISTING UNMANNED TELECOMMUNICATIONS FACILITY INCLUDING THE FOLLOWING:

   A. REMOVE (6) PANEL ANTENNAS, THREE (3) TMAs AND THREE (3) REMOTE RADIO HEADS MOUNTED ON THE EXISTING LOW PROFILE PLATFORM.
   B. INSTALL (6) PANEL ANTENNAS AND THREE (3) REMOTE RADIO HEADS MOUNTED ON THE EXISTING LOW PROFILE PLATFORM.
   C. INSTALL (2) 6X12 FIBER CABLES FROM GROUND TO ANTENNAS WITHIN MONOPOLE.

PROJECT INFORMATION

SITE NAME:	CT115/SNET VALLEY_FT
SITE ID:	CT11115F
SITE ADDRESS:	38 SPRING HILL LANE BETHEL, CT 06801
APPLICANT:	T-MOBILE NORTHEAST, LLC 35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002
CONTACT PERSON:	DAN REID TRANSCEND WIRELESS, LLC (203) 592-8291
ENGINEER:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD RD. BRANFORD, CT 06405
PROJECT COORDINATES:	LATITUDE: 41°-21'-43.99" N LONGITUDE: 73°-23'-48.00" W GROUND ELEVATION: 811'± AMSL SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM GOOGLE EARTH.

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	0
N-1	DESIGN BASIS AND SITE NOTES	0
C-1	SITE LOCATION PLAN	0
C-2	COMPOUND PLAN, ELEVATION AND ANTENNA MOUNTING CONFIG.	0
E-1	TYPICAL ELECTRICAL DETAILS	0

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2012 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2016 CONNECTICUT SUPPLEMENT, INCLUDING THE TIA/EIA-222 REVISION "G" "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES." 2016 CONNECTICUT FIRE SAFETY CODE, NATIONAL ELECTRICAL CODE AND LOCAL CODES.
2. CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUBCONTRACTORS AND ALL RELATED PARTIES. THE SUBCONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
3. CONTRACTOR SHALL PROVIDE A COMPLETE BUILD-OUT WITH ALL FINISHES, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND PROVIDE ALL ITEMS AS SHOWN OR INDICATED ON THE DRAWINGS OR IN THE WRITTEN SPECIFICATIONS.
4. CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT TO COMPLETE THE WORK AND FURNISH A COMPLETED JOB ALL IN ACCORDANCE WITH LOCAL AND STATE GOVERNING AUTHORITIES AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION OVER THE WORK.
5. CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTION, PLUMBING, ELECTRICAL AND HVAC. PERMITS SHALL BE PAID FOR BY THE RESPECTIVE SUBCONTRACTORS.
6. CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. THE CONTRACTOR SHALL FURNISH AN "AS-BUILT" SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.
7. LOCATION OF EQUIPMENT, AND WORK SUPPLIED BY OTHERS THAT IS DIAGRAMMATICALLY INDICATED ON THE DRAWINGS SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL DETERMINE LOCATIONS AND DIMENSIONS SUBJECT TO STRUCTURAL CONDITIONS AND WORK OF THE SUBCONTRACTORS.
8. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY.
9. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
10. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
11. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER MFR.'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
12. ANY AND ALL ERRORS, DISCREPANCIES, AND 'MISSED" ITEMS ARE TO BE BROUGHT TO THE ATTENTION OF THE T-MOBILE CONSTRUCTION MANAGER DURING THE BIDDING PROCESS BY THE CONTRACTOR. ALL THESE ITEMS ARE TO BE INCLUDED IN THE BID. NO 'EXTRA' WILL BE ALLOWED FOR MISSED ITEMS.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
14. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE CONSTRUCTION MANAGER FOR REVIEW.
15. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
16. COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUIT AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
17. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
18. THE CONTRACTOR SHALL CONTACT "CALL BEFORE YOU DIG" AT LEAST 48 HOURS PRIOR TO ANY EXCAVATIONS AT 1-800-922-4455. ALL UTILITIES SHALL BE IDENTIFIED AND CLEARLY MARKED. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.
19. CONTRACTOR SHALL COMPLY WITH OWNERS ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.

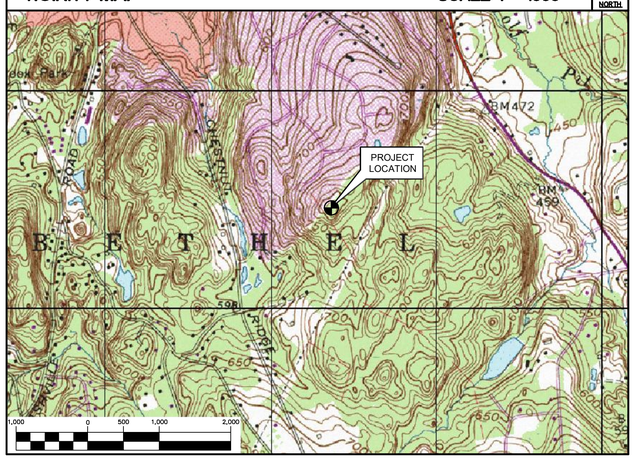
SITE DIRECTIONS

FROM: 35 GRIFFIN ROAD SOUTH, BLOOMFIELD, CT 06002 **TO:** 38 SPRING HILL LANE, BETHEL, CT 06801

1.	HEAD NORTHEAST ON GRIFFIN RD S TOWARD W NEWBERRY RD	0.60 MI.
2.	TURN RIGHT ONTO DAY HILL RD	4.00 MI.
3.	MERGE ONTO I-91 S	6.90 MI.
4.	TAKE EXIT 32A-328 FOR I-84W TOWARD WATERBURY	0.50 MI.
5.	MERGE ONTO I-84	45.60 MI.
6.	TAKE EXIT 11 TOWARD CT-34/DERBY/NEW HAVEN	0.90 MI.
7.	TURN LEFT ONTO WASSERMAN WAY	1.00 MI.
8.	CONTINUE ONTO MILE HILL ROAD	0.50 MI.
9.	TURN RIGHT ONTO CT-25 N/S MAIN ST	0.70 MI.
10.	TURN LEFT ONTO CT-302 W/SUGAR ST	6.40 MI.
11.	TURN LEFT ONTO HIGHLAND AVE	0.30 MI.
12.	CONTINUE ONTO GOVERNORS LN	0.10 MI.
13.	TURN RIGHT ONTO SPRING HILL LN	0.60 MI.

VICINITY MAP

SCALE: 1" = 1000'



PROFESSIONAL ENGINEER SEAL

STATE OF CONNECTICUT — LICENSED PROFESSIONAL ENGINEER

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	05/10/18	TJL	CAG	ISSUED FOR CONSTRUCTION
B	05/10/18	TJL	CAG	PRELIMINARY CDs - REVISED CABLE QUANTITIES
A	05/9/18	TJL	CAG	PRELIMINARY CDs - ISSUED FOR CLIENT REVIEW

T-Mobile

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T-MOBILE NORTHEAST LLC
WIRELESS COMMUNICATIONS FACILITY
CT115/SNET VALLEY_FT
SITE ID: CT11115F
38 SPRING HILL LANE
BETHEL, CT 06801

DATE: 05/09/18
SCALE: AS NOTED
JOB NO. 18058.27

TITLE SHEET

T-1

Sheet No. 1 of 5

DESIGN BASIS:

GOVERNING CODE: 2012 INTERNATIONAL BUILDING (IBC) AS MODIFIED BY THE 2016 CT STATE BUILDING CODE AND AMENDMENTS.

1. DESIGN CRITERIA:

- WIND LOAD: PER TIA 222 G (ANTENNA MOUNTS):
- RISK CATEGORY: II (BASED ON IBC TABLE 1604.5)
- NOMINAL DESIGN SPEED (TOWER AND FOUNDATION): 93 MPH (Vasd) (EXPOSURE B/IMPORTANCE FACTOR 1.0 BASED ON ASCE 7–10) PER 2012 INTERNATIONAL BUILDING CODE (IBC) AS MODIFIED BY THE 2016 CONNECTICUT STATE BUILDING CODE.
- SEISMIC LOAD (DOES NOT CONTROL): PER ASCE 7–10 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.

GENERAL NOTES:

1. ALL CONSTRUCTION SHALL BE IN COMPLIANCE WITH THE GOVERNING BUILDING CODE.
2. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
3. BEFORE BEGINNING THE WORK, THE CONTRACTOR IS RESPONSIBLE FOR MAKING SUCH INVESTIGATIONS CONCERNING PHYSICAL CONDITIONS (SURFACE AND SUBSURFACE) AT OR CONTIGUOUS TO THE SITE WHICH MAY AFFECT PERFORMANCE AND COST OF THE WORK.
4. DIMENSIONS AND DETAILS SHALL BE CHECKED AGAINST EXISTING FIELD CONDITIONS.
5. THE CONTRACTOR SHALL VERIFY AND COORDINATE THE SIZE AND LOCATION OF ALL OPENINGS, SLEEVES AND ANCHOR BOLTS AS REQUIRED BY ALL TRADES.
6. ALL DIMENSIONS, ELEVATIONS, AND OTHER REFERENCES TO EXISTING STRUCTURES, SURFACE, AND SUBSURFACE CONDITIONS ARE APPROXIMATE. NO GUARANTEE IS MADE FOR THE ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN. THE CONTRACTOR SHALL VERIFY AND COORDINATE ALL DIMENSIONS, ELEVATIONS, ANGLES WITH EXISTING CONDITIONS AND WITH ARCHITECTURAL AND SITE DRAWINGS BEFORE PROCEEDING WITH ANY WORK.
7. AS THE WORK PROGRESSES, THE CONTRACTOR SHALL NOTIFY THE OWNER OF ANY CONDITIONS WHICH ARE IN CONFLICT OR OTHERWISE NOT CONSISTENT WITH THE CONSTRUCTION DOCUMENTS AND SHALL NOT PROCEED WITH SUCH WORK UNTIL THE CONFLICT IS SATISFACTORILY RESOLVED.
8. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE SAFETY CODES AND REGULATIONS DURING ALL PHASES OF CONSTRUCTION. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROVIDING AND MAINTAINING ADEQUATE SHORING, BRACING, AND BARRICADES AS MAY BE REQUIRED FOR THE PROTECTION OF EXISTING PROPERTY, CONSTRUCTION WORKERS, AND FOR PUBLIC SAFETY.
9. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY. MAINTAIN EXISTING SITE OPERATIONS, COORDINATE WORK WITH NORTHEAST UTILITIES
10. THE STRUCTURE IS DESIGNED TO BE SELF–SUPPORTING AND STABLE AFTER FOUNDATION REMEDIATION WORK IS COMPLETE. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE AND TO ENSURE THE SAFETY OF THE STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, TEMPORARY BRACING, GUYS OR TIEDOWNS, WHICH MIGHT BE NECESSARY.
11. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
12. SHOP DRAWINGS, CONCRETE MIX DESIGNS, TEST REPORTS, AND OTHER SUBMITTALS PERTAINING TO STRUCTURAL WORK SHALL BE FORWARDED TO THE OWNER FOR REVIEW BEFORE FABRICATION AND/OR INSTALLATION IS MADE. SHOP DRAWINGS SHALL INCLUDE ERECTION DRAWINGS AND COMPLETE DETAILS OF CONNECTIONS AS WELL AS MANUFACTURER'S SPECIFICATION DATA WHERE APPROPRIATE. SHOP DRAWINGS SHALL BE CHECKED BY THE CONTRACTOR AND BEAR THE CHECKER'S INITIALS BEFORE BEING SUBMITTED FOR REVIEW.
13. NO DRILLING WELDING OR TAPING ON EVERSOURCE OWNED EQUIPMENT.
14. REFER TO DRAWING T1 FOR ADDITIONAL NOTES AND REQUIREMENTS.

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD)

   A. STRUCTURAL STEEL (W SHAPES)–––ASTM A992 (FY = 50 KSI)
   B. STRUCTURAL STEEL (OTHER SHAPES)–––ASTM A36 (FY = 36 KSI)
   C. STRUCTURAL HSS (RECTANGULAR SHAPES)–––ASTM A500 GRADE B, (FY = 46 KSI)
   D. STRUCTURAL HSS (ROUND SHAPES)–––ASTM A500 GRADE B, (FY = 42 KSI)
   E. PIPE–––ASTM A53 (FY = 35 KSI)
   F. CONNECTION BOLTS–––ASTM A325–N
   G. U–BOLTS–––ASTM A36
   H. ANCHOR RODS–––ASTM F 1554
   I. WELDING ELECTRODE–––ASTM E 70XX

2. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE ENGINEER FOR REVIEW. SHOP DRAWINGS SHALL INCLUDE THE FOLLOWING: SECTION PROFILES, SIZES, CONNECTION ATTACHMENTS, REINFORCING, ANCHORAGE, SIZE AND TYPE OF FASTENERS AND ACCESSORIES. INCLUDE ERECTION DRAWINGS, ELEVATIONS AND DETAILS.
3. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL CONSTRUCTION.
4. PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.
5. FIT AND SHOP ASSEMBLE FABRICATIONS IN THE LARGEST PRACTICAL SECTIONS FOR DELIVERY TO SITE.
6. INSTALL FABRICATIONS PLUMB AND LEVEL, ACCURATELY FITTED, AND FREE FROM DISTORTIONS OR DEFECTS.
7. AFTER ERECTION OF STRUCTURES, TOUCHUP ALL WELDS, ABRASIONS AND NON–GALVANIZED SURFACES WITH A 95% ORGANIC ZINC RICH PAINT IN ACCORDANCE WITH ASTM 780.
8. ALL STEEL MATERIAL (EXPOSED TO WEATHER) SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT DIPPED GALVANIZED) COATINGS" ON IRONS AND STEEL PRODUCTS.
9. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT–DIP) ON IRON AND STEEL HARDWARE".
10. THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NON CONFORMING MATERIALS OR CONDITIONS TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER REVIEW.
11. CONNECTION ANGLES SHALL HAVE A MINIMUM THICKNESS OF 1/4 INCHES.
12. STRUCTURAL CONNECTION BOLTS SHALL CONFORM TO ASTM A325. ALL BOLTS SHALL BE 3/4" DIAMETER MINIMUM AND SHALL HAVE A MINIMUM OF TWO BOLTS, UNLESS OTHERWISE ON THE DRAWINGS.
13. LOCK WASHER ARE NOT PERMITTED FOR A325 STEEL ASSEMBLIES.
14. SHOP CONNECTIONS SHALL BE WELDED OR HIGH STRENGTH BOLTED.
15. MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.
16. FABRICATE BEAMS WITH MILL CAMBER UP.
17. LEVEL AND PLUMB INDIVIDUAL MEMBERS OF THE STRUCTURE TO AN ACCURACY OF 1:500, BUT NOT TO EXCEED 1/4" IN THE FULL HEIGHT OF THE COLUMN.
18. COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.
19. INSPECTION AND TESTING OF ALL WELDING AND HIGH STRENGTH BOLTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY.
20. FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE ENGINEER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	05/10/18	TJL	CAG	ISSUED FOR CONSTRUCTION
B	05/10/18	TJL	CAG	PRELIMINARY CDs – REVISED CABLE QUANTITIES
A	05/9/18	TJL	CAG	PRELIMINARY CDs – ISSUED FOR CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

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T-MOBILE NORTHEAST LLC
WIRELESS COMMUNICATIONS FACILITY
CT115/SNET VALLEY_FT
SITE ID: CT11115F
38 SPRING HILL LANE
BETHEL, CT 06801

DATE: 05/09/18
SCALE: AS NOTED
JOB NO. 18058.27

DESIGN BASIS AND SITE NOTES

N–1

Sheet No. 2 of 5

1
C-1

SITE LOCATION PLAN

SCALE: 1" = 50'

APPROX. NORTH

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
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A	05/9/18	TJL	CAG	PRELIMINARY CDs – ISSUED FOR CLIENT REVIEW

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T-MOBILE NORTHEAST LLC

WIRELESS COMMUNICATIONS FACILITY

CT115/SNET VALLEY_FT
SITE ID: CT11115F
38 SPRING HILL LANE
BETHEL, CT 06801

DATE: 05/09/18
SCALE: AS NOTED
JOB NO. 18058.27

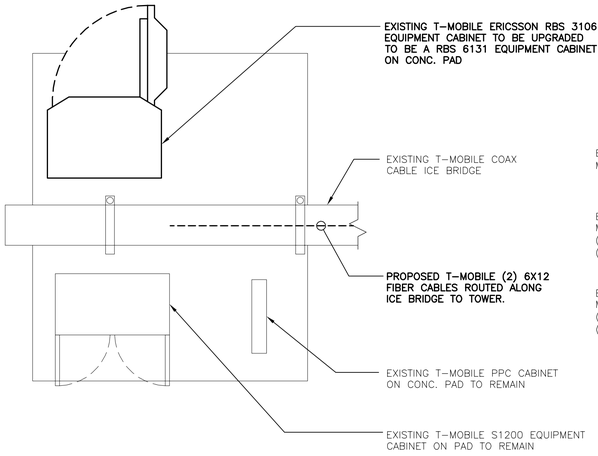
SITE LOCATION PLAN

C-1

Sheet No. 3 of 5

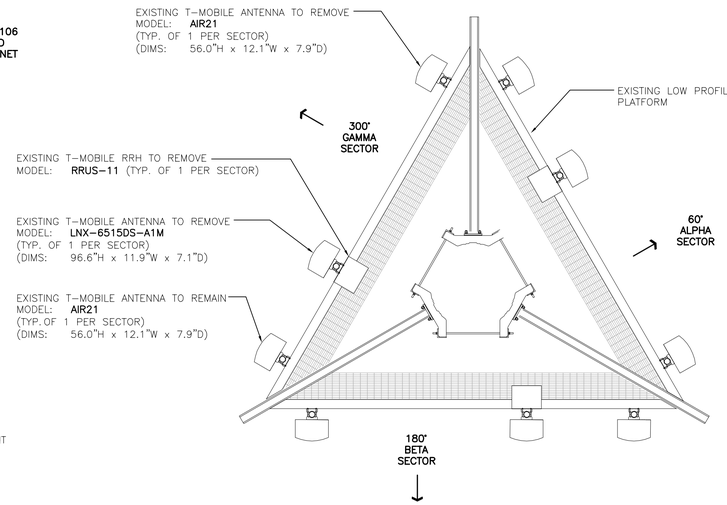
T-MOBILE RAN TEMPLATE:
67D92DB OUTDOOR

T-MOBILE RF CONFIGURATION:
6792DB_2xAIR+1QP



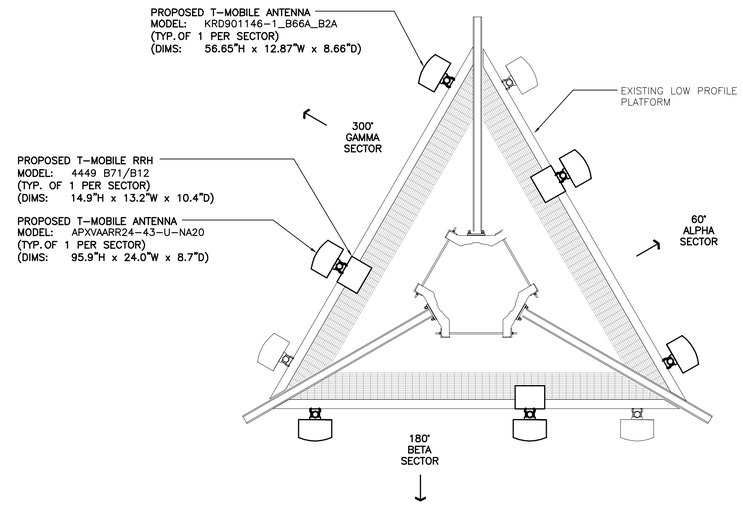
3 C-2 **EQUIPMENT PLAN**
SCALE: 3/8" = 1'

APPROX. NORTH



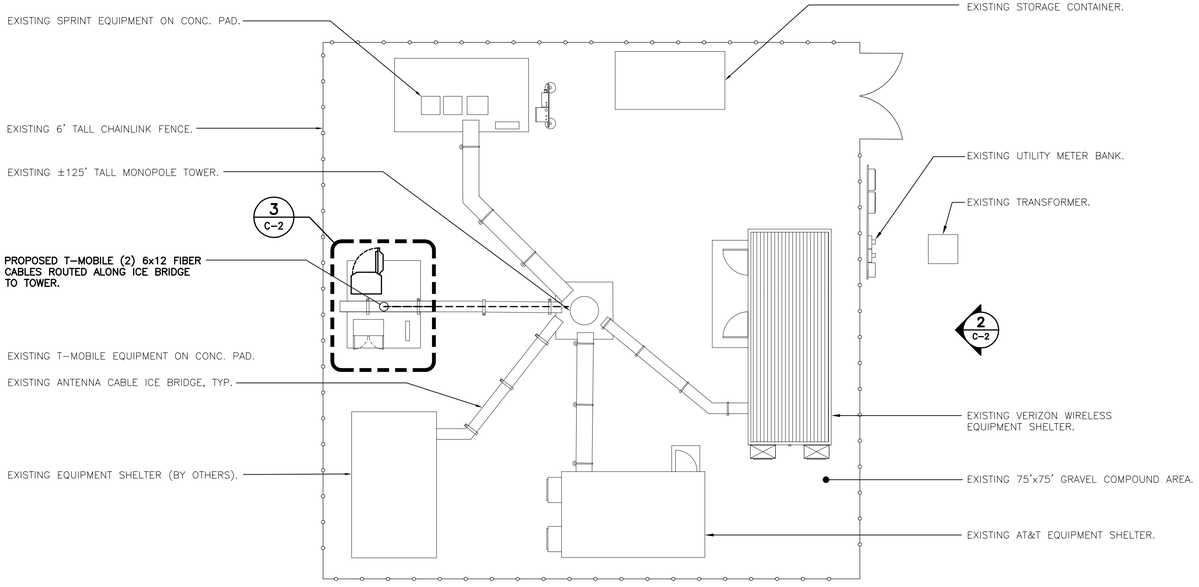
4 C-2 **EXISTING ANTENNA MOUNTING CONFIGURATION**
SCALE: 3/8" = 1'
102' ELEVATION

TRUE NORTH



5 C-2 **PROPOSED ANTENNA MOUNTING CONFIGURATION**
SCALE: 3/8" = 1'
102' ELEVATION

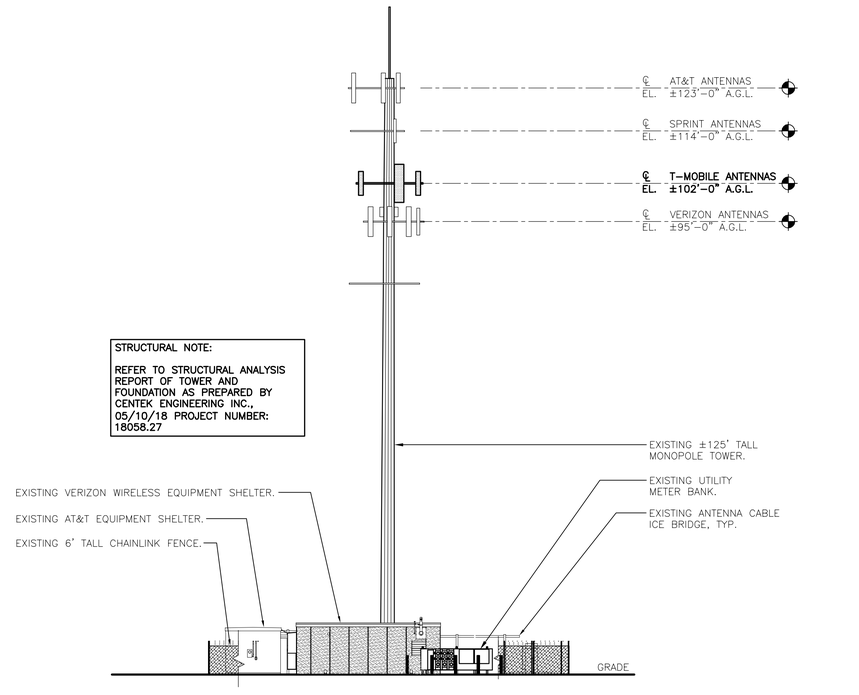
TRUE NORTH



1 C-2 **COMPOUND PLAN**
SCALE: 1" = 10'

APPROX. NORTH

GRAPHIC SCALE
10 0 5 10 20 40
(IN FEET)
1 inch = 10 ft.



2 C-2 **EAST TOWER ELEVATION**
SCALE: 1" = 15'

GRAPHIC SCALE
15 0 7.5 15 30 60
(IN FEET)
1 inch = 15 ft.

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PROFESSIONAL ENGINEER SEAL
STATE OF CONNECTICUT
TIMOTHY J. LYNCH
27515
REGISTERED PROFESSIONAL ENGINEER

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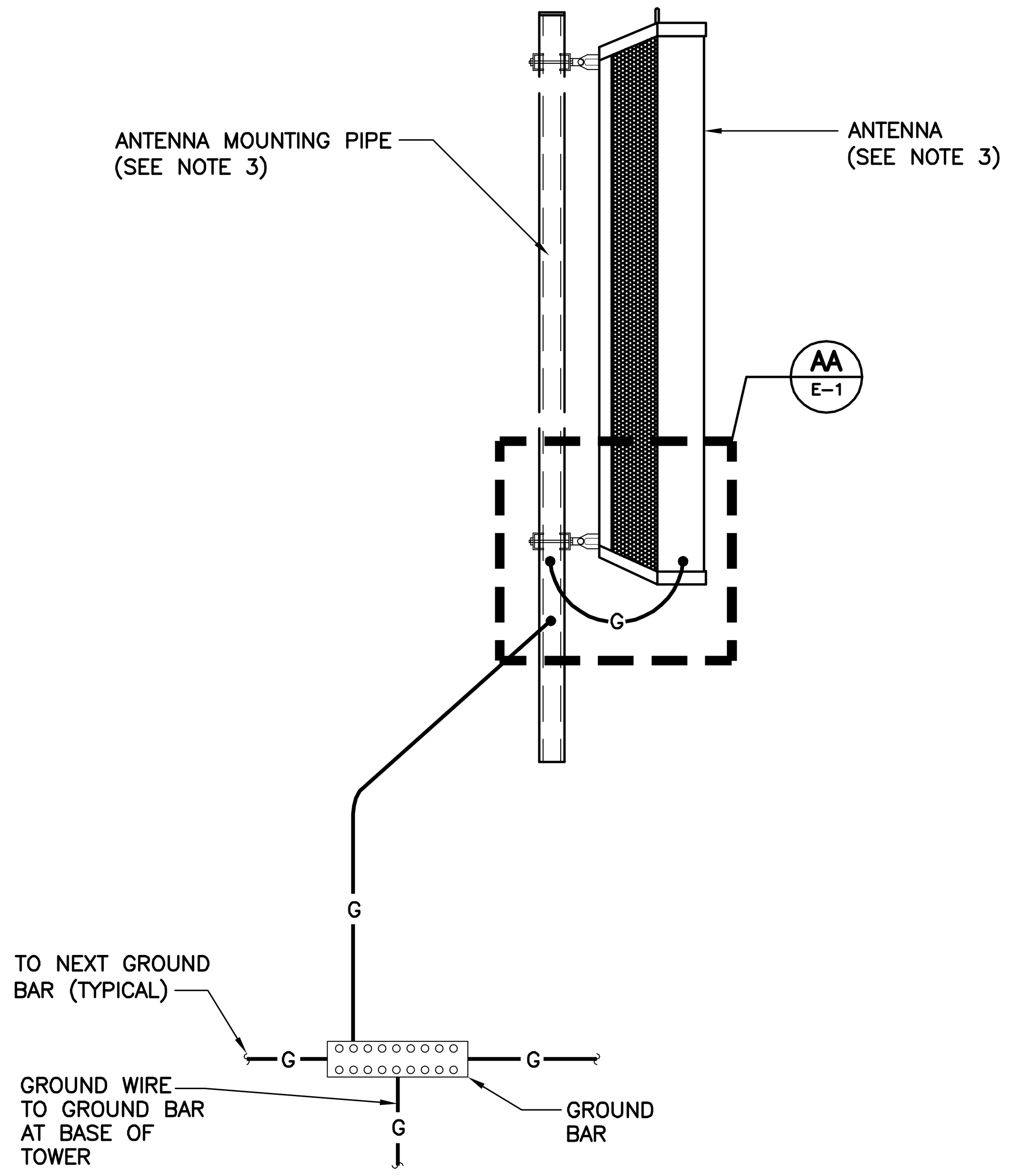
DATE:	05/09/18
SCALE:	AS NOTED
JOB NO.	18058.27

COMPOUND PLAN, ELEVATION AND ANTENNA MOUNTING CONFIG.

C-2

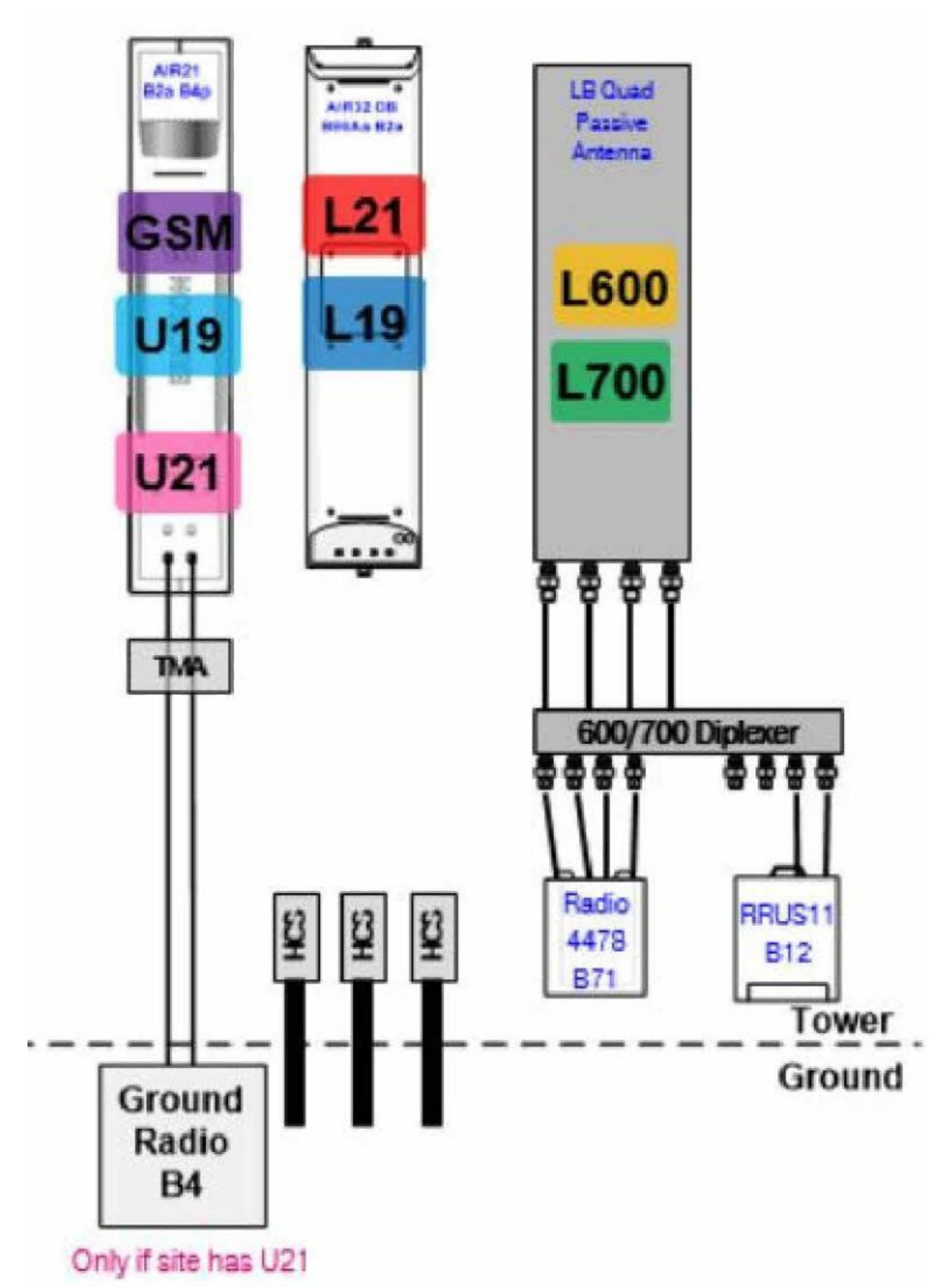
Sheet No. 4 of 5



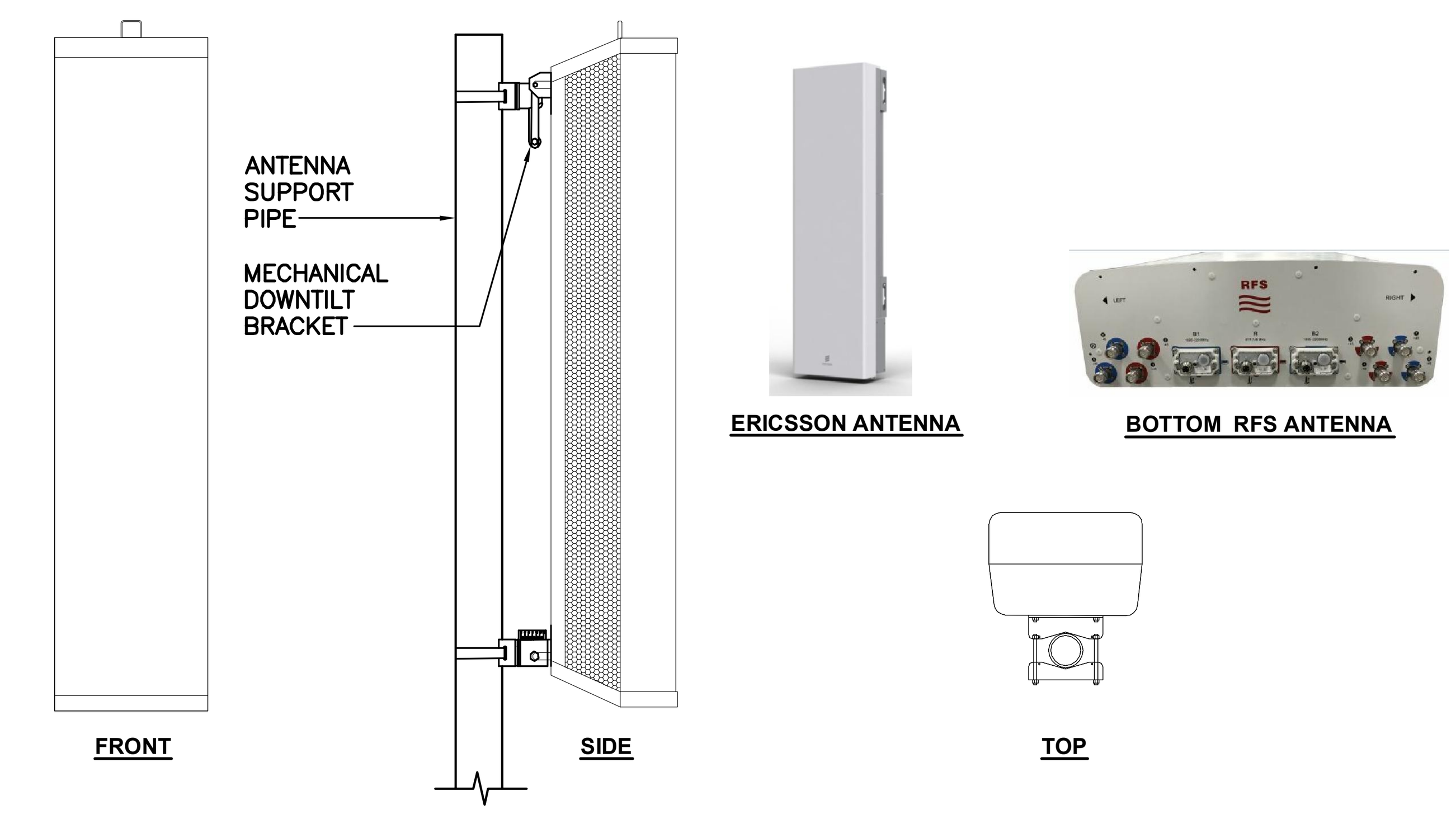
NOTES:

1. BOND COAXIAL CABLE GROUND KITS TO EACH OWNER'S GROUND BAR ALONG ENTIRE COAX RUN FROM ANTENNA TO SHELTER.
2. BOND ALL EQUIPMENT TO GROUND PER NEC AND MANUFACTURERS SPECIFICATIONS.
3. DETAIL IS TYPICAL FOR ALL ANTENNA SECTORS, INCLUDING GPS ANTENNA.

1 (E-1) TYPICAL ANTENNA GROUNDING DETAIL
SCALE: NONE

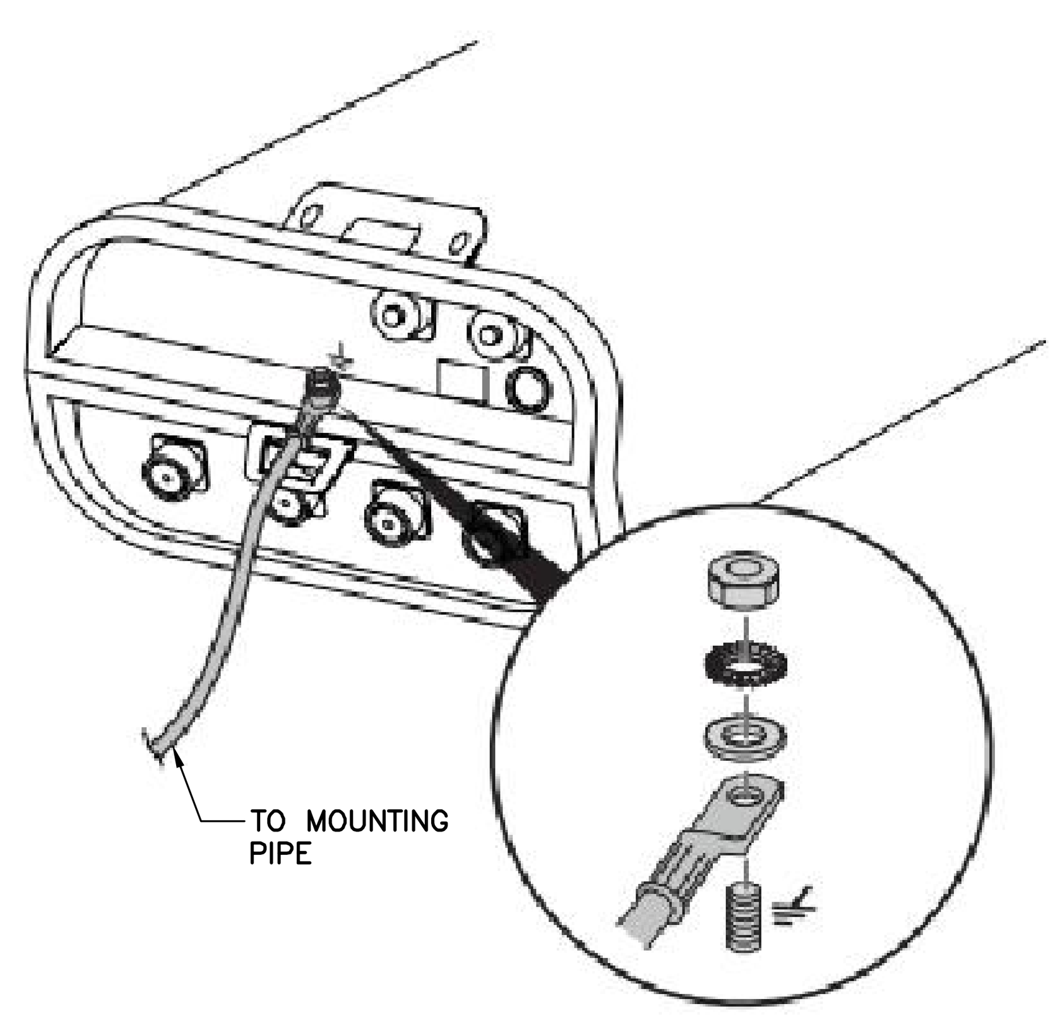


2 (E-1) PROPOSED PLUMBING DIAGRAM
SCALE: NONE



ALPHA/BETA/GAMMA ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: ERICSSON MODEL: AIR32	56.6"L x 12.9"W x 8.7"D	133 LBS.
MAKE: RFS MODEL: APXVAARR24_43-U-NA20	95.9"L x 24.0"W x 8.7"D	153 LBS.

4 (E-1) PROPOSED ANTENNA DETAIL
SCALE: NONE



AA (E-1) TYPICAL ANTENNA GROUNDING DETAIL
SCALE: NONE

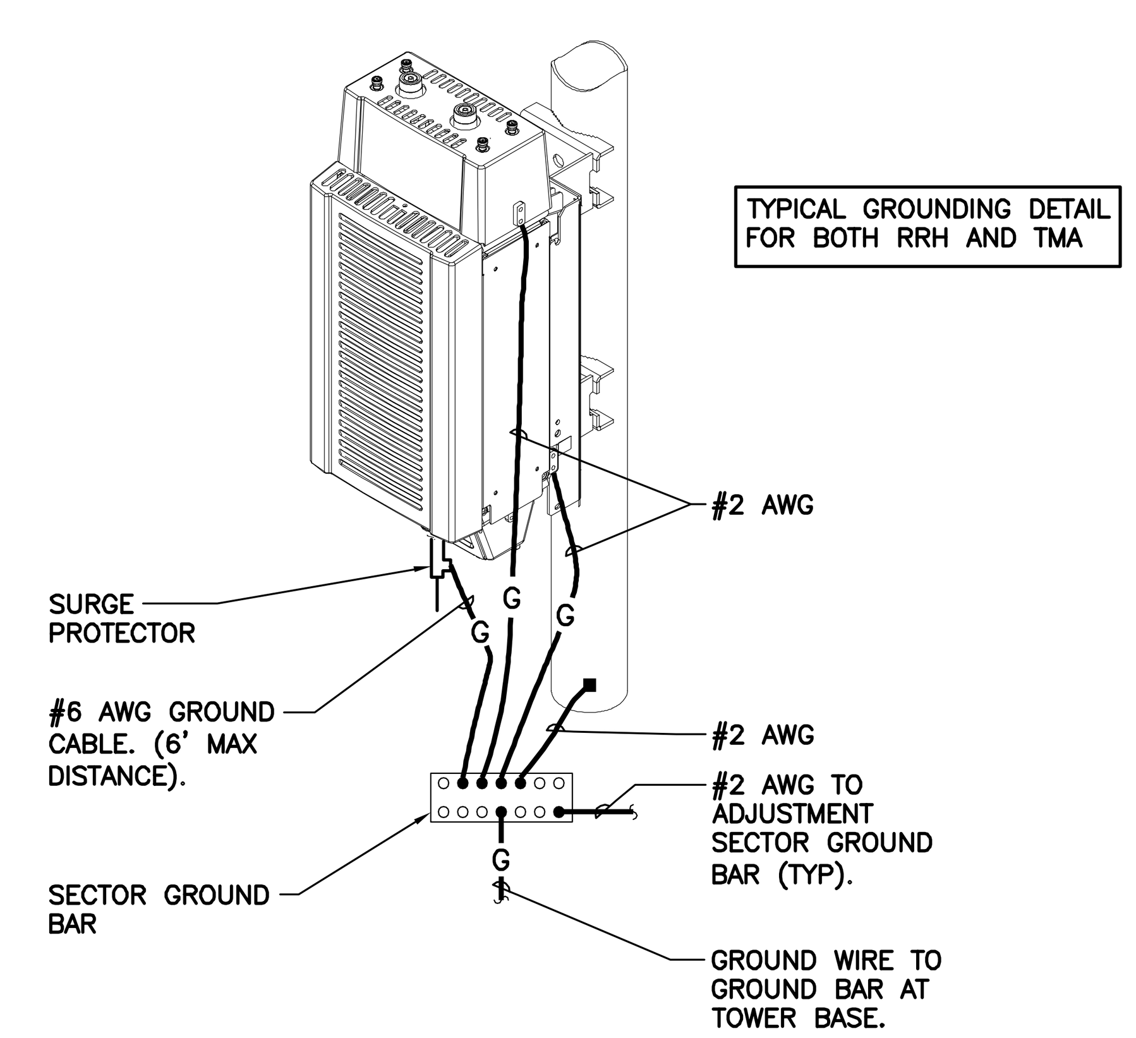
ISOMETRIC VIEW

RRU (REMOTE RADIO UNIT)			
EQUIPMENT	DIMENSIONS	WEIGHT	CLEARANCES
MAKE: ERICSSON MODEL: RADIO 4449 B71B12	14.9"L x 13.2"W x 10.4"D	74 LBS.	ABOVE: 16" MIN. BELOW: 12" MIN. FRONT: 36" MIN.

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH T-MOBILE CONSTRUCTION MANAGER PRIOR TO ORDERING.

3 (E-1) PROPOSED RRU DETAIL
SCALE: NONE

EACH RRH CABINET SHALL BE GROUNDED IN THE FOLLOWING MANNER:
1. AT TOP OF THE CABINET
2. AT RIGHT SIDE OF THE CABINET.



5 (E-1) RRU/TMA POLE MOUNT GROUNDING
NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	05/10/18	TJL	CAG	ISSUED FOR CONSTRUCTION
B	05/10/18	TJL	CAG	PRELIMINARY CDs – REVISED CABLE QUANTITIES
A	05/9/18	TJL	CAG	PRELIMINARY CDs – ISSUED FOR CLIENT REVIEW

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www.CentekEng.com

T-MOBILE NORTHEAST LLC
WIRELESS COMMUNICATIONS FACILITY
CT115/SNET VALLEY_FT
SITE ID: CT11115F
38 SPRING HILL LANE
BETHEL, CT 06801

DATE: 05/09/18
SCALE: AS NOTED
JOB NO. 18058.27

TYPICAL ELECTRICAL DETAILS

E-1

Sheet No. 5 of 5